Tuula Tynjä

FROM THE FIELD TO THE PUBLICATION

The Retrieval and Presentation of Pottery – a Case study from Early Iron Age Tel Kinrot, Israel

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Contents

List of Appendices

Figure 2.3 from the courtesy Near Eastern Archaeology.

Figs. 5.4, 5.6, 5.7, 5.11, 5.13, 5.33, 5.39, 5.42, 5.46A, 5.47, 5.50, 5.54, 5.55, 5.56, 5.58, 5.59, 5.110–5.114, 5.126, 5.127 and all graphics by Tuula Tynjä. Other figures in Chapter 5 are © KRP.

ABSTRACT

All research is bound to be selective about what to include in a study. In archaeological research, there is the additional limitation that the archaeological record is inherently only partially preserved due to the effects of ancient discard patterns and natural phenomena over time. These natural and anthropogeneous formation processes have been studied, but the consequences of research-based selections have been largely ignored.

In this study, I investigate the impact of a deliberately designed archaeological retrieval strategy on the resultant artifact assemblage, both as to its size and quality. By *retrieval strategy* I mean the criteria that are used when deciding which material is to be kept from all the excavated material. The material that is discarded during fieldwork is typically dumped on a specific spot at the excavation site. Even though this material can be recovered later for further study, its contextual information is lost. Therefore, the discarded material is reduced in quality to that of stray finds, with little archaeological value. The discarded material may be documented in various different ways, and the information resulting from this process varies as well. My study indicates that it is important to document both the discarded material and the selection criteria used to differentiate it from the kept material.

The recovered and kept material undergoes another selection process when only a part of this assemblage is selected for further, more detailed study. Important decisions in this process concern the features that are recorded, and the way in which the material is presented in the final site report. Even though archaeological reports only present a fraction of the recovered material, and only selected aspects of it at best, the criteria used in this material selection are constantly absent from archaeological reports. Ceramics typically constitute the clear majority of finds, and are usually reported as a typology – which is a fairly fixed tradition of classification and description. However, without knowing the selection process that the material went through to form the typological assemblage, our confidence in the final results may be reduced. My typological analysis of the Tel Kinrot pottery attempts to overcome this challenge by presenting the selection process in detail and analyzing its effects on the final study assemblage. The resulting typology indicates that the Iron Age settlement and the subsequent phases of occupation on the slope can be dated from the beginning of the Early Iron Age to the early phases of Iron Age II. The pottery corresponds to that from other sites of the time, especially in the Northern Jordan rift valley. Some pottery types also seem to reflect contacts with the Phoenician coast.

Using a single site excavated by different teams with differing methods as a basis for analysis can yield insights into the differences brought about by chosen methods of retrieval, recording, and study. I have compared materials from two projects at Tel Kinrot. The first project took place in 1994–2001, and the later in 2003–2008. I have compared their respective pottery assemblages and documentation. The excavated areas of the two projects are adjacent to each other, and in some cases the same architectural units were even studied by the two projects. Therefore, the primary formation processes can be assumed to be very similar. This situation, combined with the introduction of changes in the retrieval strategy for the pottery from 2003 onwards, enabled me to assign the differences in the pottery assemblages to the research processes themselves with

minimal confusing factors. As the result of my comparison, it is clear that the research-based differences in the materials are strong. It thus follows that the retrieval strategies and other selection processes made by the researchers should be explicitly stated in their reports.

The retrieval strategies at Tel Kinrot can be divided into two phases: the earlier strategy was used in 1994–2001, and can be described as informal and intuitive selection. This meant keeping material that was considered diagnostic from loci that were considered important. Material was considered diagnostic if its chronological period or function could be identified. This resulted in an over-representation of small containers and lamps, and an under-representation of the most common vessel groups of bowls and cooking pots, in the pottery assemblage. Such a bias may be expected in many reports, especially in the older ones. During the later excavations by the Kinneret Regional Project (KRP) in 2002–2008, an intensive retrieval and keeping strategy was conducted in two newly opened excavation areas. In these two areas, all rim fragments and an informal selection of body sherds were kept. In areas that had been excavated already in the 1990's, the retrieval strategy followed the earlier practice of informal selection. However, the discarded material from these areas was documented in more detail than the discarded material was documented during the earlier excavations. All of the identified diagnostic pottery from all loci was weighed and counted during the field work. The addition of this information already provides the reader with a much improved ability to evaluate the reliability of the results.

As a result of this intensive retrieval practice, the pottery assemblage from the newly opened excavation areas can be considered representative of all excavated pottery and therefore statistically sound. The assemblage is quantitatively larger than that from the previous phase of excavations, and gives more precise information about the material excavated. Qualitatively, the intensive sub-assemblage in more varying: it includes well preserved vessels, but also a host of small rim shards that are hard to identify as to their function or chronology. Because the researcher-based bias is eliminated, the material of the intensive retrieval phase is better suited to assessing the pottery used and discarded by the ancient population. Statistical analyses on such assemblages enable one to distinguish accidental differences from those that reflect real differences in the archaeological record, making the results more reliable. This constitutes a strong argument for the wide adoption of intensive retrieval strategies. Even more crucial, however, is to make the research-based selection process transparent for the reader, in order to enable a reliable evaluation of the final results.

TIIVISTELMÄ

Kaikessa tutkimuksessa tehdään valintoja sen suhteen, miten rajataan aineisto, jota hyödynnetään. Arkeologiseen tutkimukseen sisällytettävä aineisto valikoituu monella tapaa jo ennen tutkijan tekemiä rajauksia. Luonnon aiheuttamaa valikoitumista on tutkittu osana prosessuaalista tutkimusperinnettä, mutta tutkimuksen itsensä tuottamaa valikoitumista ei ole juurikaan tutkittu.

Väitöskirjassani käsittelen arkeologisen esineaineiston talteenottotavan vaikutusta esineaineistoon, sen laatuun ja määrään. Talteenottotavalla tarkoitan sitä, millaisin kriteerein löydetystä aineistosta valitaan se materiaali, joka otetaan talteen ja se materiaali, joka hylätään ja heitetään pois. Aineistoa, joka hylätään kenttätyön yhteydessä ei ole mahdollista sisällyttää myöhempään tutkimukseen. Vaikka esineet voidaan hakea kaivauspaikan hylkykasasta, ei niitä enää voida yhdistää alkuperäiseen löytökontekstiinsa. Siksi tällainen aineisto rinnastuu myöhemmän tutkimuksen kannalta irtolöytöihin, joiden arkeologinen merkitys on suhteellisen pieni. Varsinaisen talteen ottamisen ja pois heittämisen lisäksi merkittäviä valintoja ovat myös ne tavat, jolla kaikki löydetty aineisto – myös hylätty – dokumentoidaan. Mitä tarkemmin hylätty aineisto dokumentoidaan, sitä paremmin valikoimisen vaikutuksia voidaan myöhemmässä tutkimuksessa arvioida. Aineistoa valikoidaan vielä tutkimuksen aikana, erityisesti silloin, kun aineisto julkaistaan. Kinneretin keramiikan typologinen analyysi osoittaa, että aineisto voidaan ajoittaa varhaiselle rautakaudelle ja rautakauden II periodin alkuun. Erityisesti samankaltaisia esineitä esiintyy Jordanin laaksossa, mutta aineisto heijastaa myös kontakteja Foinikian rannikolle.

Tarkastelen aineiston valikoitumista rautakautisen keramiikka-aineiston avulla, joka on kaivettu kahden arkeologisen projektin yhteydessä Kinneretin asuinpaikalta nykyisen Israelin alueella. Koska kyseessä on yksi asuinpaikka, jossa kaivetut alueet ovat lähellä toisiaan, voidaan muut aineiston muotoutumiseen vaikuttavat seikat olettaa minimaalisiksi. Kinneretissä eri tavoin talteen otettujen keramiikka-aineistojen vertailu osoittaa, että erilaiset talteenottotavat tuottavat sekä laadullisesti että määrällisesti erilaisia aineistoja. Tästä syystä talteenottotapa tulisi raportoida.

Kinneretin kaivausprojektien talteenottotavat voidaan jakaa kahteen. Vuonna 1994–2001 toteutettujen kaivausten talteenottoa voidaan luonnehtia intuitiiviseksi valikoimaksi. Tällöin säilytettiin valikoima kronologisesti tunnistettuja esineitä ja sirpaleita arkeologisesti mielekkäiksi arvioiduista konteksteista. Vuosina 2002–2008 toteutettujen Kinneret Regional Project-kaivausten (KRP) aikana niillä kaivausalueilla, joilla viimeisteltiin 1990-luvulla aloitettua työtä, talteenottotapa noudatti aiempaa perinnettä tallettaa valikoituja, tunnistettavia esineitä ja fragmentteja merkittävinä pidetyistä konteksteista. Hylätty aineisto kuitenkin dokumentointiin tarkemmin kuin 1990-luvulla: aineisto punnittiin ja kaikki kronologisesti tunnistetut esineet tai fragmentit laskettiin. Näin pois heitetystä aineistosta on KRP:n kaivausten osalta merkittävästi enemmän informaatiota saatavilla. Tämä antaa tiedeyhteisölle paremmat mahdollisuudet arvioida aineiston edustavuutta suhteessa kaikkeen kaivettuun keramiikkaan ja siitä tehtyjen johtopäätösten luotettavuutta. KRP:n kaivauksilla kahdella kaivausalueella otettiin käyttöön toinen, intensiivisempi talteenottotapa. Tällöin kaikki keramiikka-astioiden reunakappaleet säilytettiin ja analysoitiin. Intensiivisen talteenoton seurauksena käytettävissä oleva aineisto on suurempi ja sitä voidaan pitää tilastollisesti edustavana. Tällainen määrällisesti laajempi aineisto antaa täsmällisemmän kuvan kaivetusta aineistosta kokonaisuutena ja intensiivisempää talteenottotapaa tulisi siksi suosia. Kun vertasin tilastollisesti edustavaa osa-aineistoa valikoivasti kerättyyn aineistoon, kävi ilmi, että valikoivasti kerätyssä aineistossa pienet suljetut astiat olivat yliedustettuja, kun taas yleisimmät astiaryhmät, kulhot ja keittoastiat, olivat aliedustettuja. Vastaavaa astiaryhmien yleisyyden vinoumaa esiintynee todennäköisesti, erityisesti varhaisissa raporteissa.

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In Helsinki, on the 6th February,
Tuula Tynjä

Chapter 1 Introduction

1.1 Framing the Question: Aims and Background

> The reliability of historical conclusions offered by him [the excavator] as the result of his work, is in the final analysis dependent on the thoroughness of his field technique and the completeness and practicality of his system of recording what he finds. Increasingly in the future, students of archaeological reports will desire information on the methods employed. (William Badè 1934: 8–9)

To what degree are the results of each and every of our research projects dependent upon the perspective and methods of the modern scholar? This question is important for every researcher, but is especially vital for archaeologists, who often destroy the evidence, at least partially, during the course of their work. Making the choice about what to study in detail and what to discard, either wholly or by leaving it out of the analyzed material, has consequences for the results of any study. Large amounts of finds are typical of archaeological projects in the Near East or Mediterranean, for a variety of time periods, and for Medieval or later periods this holds true over most of the world. In these traditions, the selection-making process during and after excavations is an integral part of the study, which is however rarely discussed in detail in publications. Thus, the readers of archaeological reports are often left without important information affecting the results.

The aim of this thesis is to describe and reconstruct the process of archaeological artifact study, from the selection of the finds to their presentation in publications, as well as the interpretations of the material. There is a chain of selections that is made during the study of ceramics. This chain begins during the field work, and passes through several points before ending up with the publications. The pottery description is traditionally written as a typology, often supplemented by type frequencies. The typology can be regarded as the end product of the artifact study. The selections that are made during this process affect the nature of the pottery assemblages. Defining the research-based differences in the pottery assemblages thus helps to evaluate the reliability of the interpretations that are made using the pottery material as evidence. The validity of the tools for presenting the archaeological artifacts is essential for all subsequent research, be it historical or social. Herein I will discuss practices of selection making, methods of presenting the pottery according to a typology, and other analytical tools used in artifact study.

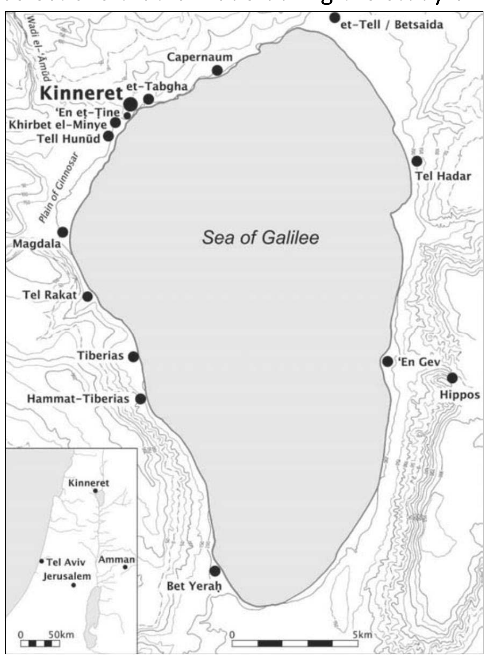


Fig. 1.1 Tel Kinrot (ancient Kinneret) and its surroundings, drawn by Ronja Kratz &Stefan Münger © KRP

I will use two pottery assemblages from one site, *Tel Kinrot* (Fig. 1.1) in modern northern Israel, as a case study. I will examine the ways that the finds have been selected and analyzed, both during and after the excavations, using two different strategies (intuitive selection and systematic sampling, see below). There have been three large scale excavation projects at the site. The first was conducted on the upper mound in the 1980's, and was published in 1990 by *Volkmar Fritz* (1938–2007). The second project was conducted by Fritz in 1994–2001, on the eastern slope of the mound. The third, the *Kinneret Regional Project (KRP)*, was co-directed by *Stefan Münger, Juha Pakkala* and *Jürgen Zangenberg*, with excavations taking place from 2003–2008. The KRP continued the work on the eastern slope. I worked as finds registrar for the KRP from 2003–2008. This study focuses on the material from the two latter projects, as they were both carried out on the same area of the site and focused on the Early Iron Age, while the excavations in the 1980's were focused on the Late Iron Age.

This study has a methodological interest. I first faced the difference between the pottery assemblages of the two latter excavation projects when I was preparing the typological descriptions of the pottery from the excavations on the slope of Tel Kinrot for the final site report. I had started the classificatory work with well-preserved vessels from the excavation project directed by Fritz (1994–2001). First, I worked with drawings and made short definitions or labels for the vessel groups. Before starting a more detailed description, I also thoroughly analyzed the ceramic material, consisting mainly of shards found during the KRP. I found it hard to integrate the shard material from the KRP (2003–2008) with the preliminary descriptions based on drawings of well-preserved vessels. The assemblages were different both in their number and in their state of preservation. The earlier excavated assemblage included 705 registered vessels/vessel fragments (drawn and described on find cards). The majority of them can be described as well preserved. The drawn fragments were rather easy to identify and classify. In addition, a selection of shards from clean loci was kept "as a proof for the dating" (personal communication, Münger 18.12.2012). However, these shards were not analyzed, nor was it planned that they would be published. I was able to have a look at the material from Fritz's excavations in the German Protestant Institute for Archaeology in Jerusalem in December 2003 and April 2004. This material (excavated from 1994–2001) has since 2005 been stored by the Israel Antiquities Authority at Beth-Shemesh. It includes, by a rough estimation, a few thousand shards in addition to the well preserved items that were recorded on find cards. The selected shards were numbered and stored in cardboard boxes. As they were not further analyzed, they are of little value for the academic audience. The assemblage retrieved since 2003 includes 3817 ceramic items (over 3700 vessels or vessel fragments), most of which were rim shards. All items were registered in a digital database. The quantitative as well as qualitative asymmetry between the pottery assemblages inevitably drew my attention. The difference was related to the different retrieval strategies for the pottery finds, which determined what was kept and analyzed. These decisions, made early in the research process, have had a strong impact on the ways that the material can be analyzed, what kinds of results can be achieved, and how reliable the conclusions are.

The question

With the help of a detailed case study of the Tel Kinrot excavations, I will explore how the chosen retrieval strategies and analytic methods used in artifact studies affect the results of subsequent research. The retrieval strategy has two parts: the process of deciding what is kept and what is discarded in the first place, and then how the kept material is further analyzed. In addition, the way in which the material is presented to the audience has consequences for its future utility and any following interpretations. This holds both as regards the readers' ability to follow the initial interpretations, as well as the usefulness of the material for subsequent research. The retrieval strategy used reflects the research tradition and goals of the scholars involved. The strategy of keeping only some material in the first place naturally has consequences for what kind of analyses can be executed. Thus, the type of questions that can be posed about the material are partly a result of the selected retrieval strategy. I will compare two pottery assemblages that were formed by two rather common strategies in Near Eastern archaeology: informal selection and systematic sampling. In *informal selection* a rather intuitive selection of "important and indicative" material is selected to represent the collected material (Orton 2000: 2). Such a strategy was used during Fritz's excavations (1994–2001). *Systematic sampling* is more formalized, i.e. it is an explicitly defined procedure. In the case of the Tel Kinrot excavation, this method of sampling included keeping and analyzing all rim parts, regardless of how important they were considered. In addition, an intuitive selection of other shards was kept. Systematic sampling was used in two excavation areas during the KRP (2003–2008). It is important to acknowledge that both strategies are selections. It would be a gross over-simplification to say that the informal selection process was bad and the systematic sampling was good – they served different purposes and had different impacts on the nature of the assemblages derived from them, as well as how the material could be later analyzed (Orton 2000: 2–3). Only preliminary articles have been published so far from the excavations on the slope, and this study is based on unpublished materials formed by the two differing strategies. I have made both the typology and the statistical analyses myself. Because each ancient site has a unique assemblage of artifacts, no earlier typology as such is wholly applicable, but requires modifications in order to faithfully describe the material. At the same time, comparability to other sites demands that the typology shares its vocabulary with and relates to the existing typologies. As there is a large amount of shards derived from the systematic retrieval, I used statistical methods in order to gain an overview of and insights into the material.

The differences in the information yielded by the artefact study relate to the different selection strategies, recording methods, and methods of analysis. What kind of information is produced, and to what extent is one able to expand the research, if one collects and records all rim parts of pottery, instead of working with selected well-preserved vessels? The amount of items is manifold, but the information gained is fragmented and sometimes difficult to interpret. The nature of the larger material assemblage also affects the descriptive work with pottery, which is commonly written as a typology. Pottery typologies in Israel-Palestine form a rather fixed literary genre (section 2.5). Typological methods have been discussed actively in research (e.g. Klejn 1982; Adams & Adams 1991; Welinder 1991; Langin-Hooper 2011, 2013; Gnecco & Langebaeck eds. 2014). However, the relation between the field work and selection of finds to the typological presentations has been largely ignored. It is unclear how the addition of shard material affects typology building. In most excavation reports published in Israel, the shard material is included in frequency tables calculated for different vessel types (e.g. Arie 2006, Panitz-Cohen 2009). Even though the whole form of the vessel cannot be directly observed from the shards, there are many features that can be readily observed from the fragments (e.g. tempering, forming technique, surface treatment). The information concerning such features could be integrated into the typologies, even though they are traditionally very morphological (Schaub 1996: 232).

The nature of a pottery assemblage enables certain questions, while it may preclude others. Quantitative aspects of artifact study are largely excluded when an informal retrieval strategy is used. Certain features of the material might reveal more of the formation processes of the contexts, or be vital for distinguishing functional activity areas. Others might help in interpreting the mixed contexts so common at sites with a long history of settlement. It is of interest to examine whether the more systematic retrieval of the pottery finds brings about similar advantages in different contexts. In Israel, it has been customary to keep more material from so called “clean loci”, consisting of homogeneous material in the chronological sense (Sharon 1995, Davis 2004: 73–74). Similarly, artefacts from well-defined contexts are studied more extensively, while the chronologically mixed contexts are excluded from analyses (e.g. Arie 2006). This is a significant choice. In the study of well stratified contexts the increased amount of material enables subtle chronological trends to arise. The intensive study of materials from mixed contexts might yield information helpful for the interpretation of their formation (e.g. constructional fill vs. accumulation). What are the benefits of more intensive and detailed recording, and what are the costs of pursuing it? A discussion of such themes should be beneficial for planning any excavation project. This study is first and foremost a case study of Tel Kinrot, but the results can be projected onto the wider perspectives of archaeology in Israel-Palestine.

How the question is approached: the source material

I focus on artifact studies, from the selection of the pottery finds to the analyses, publication, and interpretations achieved by this process. The nature and interpretations of archaeological material are always affected by the contexts of the finds. The research processes at different sites are difficult to compare with each other, because there are too many other factors related to the nature of the site that blur the picture. Exploring the differences in the materials from one site is better able to produce insights into the differences brought about by selection strategies, recording methods, and analytical tools. Therefore, a case study is a valid method to determine the impact of the retrieval strategy and recording system. The primary material under study is from the Tel Kinrot excavations of 1994–2001 and 2003–2008, with their respective pottery assemblages, their documentation of the pottery, and their related publications. These excavations have focused on the Early Iron Age remains on the eastern slope of the tel. The excavated areas of the two projects are adjacent to each other, and in several cases the same architectural units have been the subject of study in these two projects. Therefore, the formation processes, both natural and anthropogenous, can be assumed to be very similar. This situation, combined with the introduction of fundamental changes in the field work concerning the documentation of loci and the retrieval strategy of the pottery from 2003 on, enables one to assign the differences in the pottery assemblages to the research processes themselves with minimal confusing factors.

I had already seen, during my first experience in field archaeology in 1999, how ceramics played a central role in the practical work of archaeologists. As an undergraduate student I witnessed the professionals engaged in lively discussion around a table with pottery finds spread over it. I chose pottery as the material for my own study because it holds a central position in archaeological reasoning in general, and the ample amount of finds allows general trends to be discerned. Pottery has traditionally been the focus of material study, for most periods from the Early Bronze Age on. The pottery typology in Israel-Palestine has long been the main dating tool for settlements. The typology is traditionally based on whole forms, with a special emphasis on rim forms and decoration. I will investigate whether a study on shard material can affect, refine, or even change the typology of the region. Constructing the typology of the Early Iron Age pottery from Tel Kinrot is only one part of the study – actually, it is the first layer of the work. It has brought about an insider's view of the process. The typology may be considered as the empirical part of the study: a trial of typological classification with quantitative aspects included, and testing my initially intuitive typology against the quantitative data collected. I reflect on the process of typology writing, and combining quantitative analyses with it, in chapter 5.

Selective retrieval has been and still is a common way of working with finds in the Near Eastern context. Shards that are considered indicative for dating or other cultural issues are kept, while "un-indicative" shards are discarded (Ben-Shlomo & Van Beek 2014: 13). As for dating, the criterion of contemporaneity with the excavated habitation layers and the selected pottery items is problematic. In simplified form, the process can be as follows: shards that look earlier according to the adopted typology are considered *residual,* and shards that typologically better fit groups from later periods are considered *intrusive*. This way of working easily leads to circular reasoning, especially if combined with a belief in exact typological dating. Especially between periods that are close to each other, such a method should be avoided. Such identifications should always be supported by other indications that an item derives from earlier or later periods (e.g. being worn, or from a context with pits). The typological dating of artifacts, especially pottery, has been the most common way of dating archaeological deposits in Israel-Palestine. The pottery typologies tend to aim at a high resolution for dating, with intervals of ca. 50 years (see chapter 2.3). If selective retrieval with a focus on contemporaneity is combined with a belief in the high resolution of dating from pottery typologies, the work easily creates assemblages that are too clean and homogeneous, which are actually much more of a scholarly construction and do not reflect the nature of the material in any unbiased way. Especially in the case of periods that are chronologically close, the fluidity of the materials has to be acknowledged. However, the fluidity is not constant either, but varies from period to period. At a multi-period site, there are many processes that will move finds that originate from an earlier layer to later layers, and finds from later layers to the earlier ones. This phenomenon should be validated by several criteria.

The excavation projects at Tel Kinrot are rooted in the culture-historical tradition, which has determined the role of their ceramic assemblages. Pottery studies have focused on chronological issues and questions of cultural relations, resulting in a special interest on well preserved vessels and features considered to be good chronological markers, such as their decoration. The publications have likewise focused on well preserved items considered to be good chronological and cultural markers, and providing good illustrations (e.g. Fritz & Münger 2002; Münger et al. 2011; Münger 2013). Chronology and ethnicity have perhaps been the most discussed themes in the archaeology of Israel-Palestine since its beginning.

Aims

Intensive retrieval increases the information available to archaeologists. The potentialities created by systematic retrieval will be evaluated considering the amount of work and the costs it inevitably entails. When an excavation project is planned, the resources required for the analyses of a larger body of finds are often difficult to estimate. I hope to present some tools for the evaluation of the usefulness of the more intensive retrieval and analysis of ceramics. When the artifact analysis is well planned, one can also avoid recording features that do not vary in the assemblage, or features that correlate with each other so strongly that only one of several measurements (e.g. clay colors of different surfaces or only one recorded color) would be needed. As the same rules cannot be applied to different sites, the importance of a pilot study on the artifacts together with trial excavations should be promoted.

This study demonstrates how the selection strategy and analytical tools used on ceramic finds affect the artifact study. The impact can be seen in the amount of the studied items, as well as in their nature. These aspects affect the possible interpretations that can be justified with the material, and the reliability of those interpretations. All of these factors relate to the research interests that the methods should serve. This study aims at making the interpretative process transparent, and enabling the audience to better evaluate the results. Such transparency for site reports in general would be beneficial. The publications, both articles and final reports, can be regarded as "the end-product" of archaeological research. The documentation forms, as well as the excavation reports, often focus on describing the results while leaving the process of interpretation aside (see Hodder 1999: 66–69; 80–84). The same principle holds for the pottery descriptions of the site reports. The pottery reports present descriptions of the ceramics, often in the form of typologies, and they aim to present the material so that it is useful for other people carrying out artifact studies. The pottery comparisons usually included in the pottery reports form chronological and cultural webs connecting phases of different sites and correlating them with each other (e.g. Mazar 2005; Arie 2006: 227–231; Arie 2013: 550–551).

Intensive retrieval strategy in Israel-Palestine

Archaeological research is often characterized by a discrepancy between the ideal of minutely documenting all that has been done before, during, and after the excavation, including a detailed study of all excavated finds, and the reality of limited resources of time and money that forces the actors to choose a lower level of documentation. Striving towards the best attainable result with minimizing the costs is a difficult equation. These decisions need to be taken before the excavations take place, and adjusted during the actual work. Still, practical tools for decision making are few. The trend in the research generally has been to excavate less, but with more accurate recording, than the preceding generations. This seems to be self-evident, but it has not been demonstrated what the costs are on one hand and the effect on the results on the other.

In the context of the archaeology of Israel-Palestine, a method of *total retrieval* has been advocated by Gus Van Beek (1989), followed with restrictions by Bonnie Magness-Gardiner (1996) and Thomas Schaub (1996). Van Beek (1922–2012) used total retrieval for all artifacts at Tell Jemmeh in the Southern Coastal Plain of modern Israel, excavated from 1970–1978 in large scale with four additional minor seasons between 1982 and 1990 (Ben-Shlomo & Van Beek 2014: 11). Van Beek combined the total retrieval of pottery with the maximum effort to reconstruct the vessels. This meant keeping and numbering each shard that was found, irrespective of the size of the item or the nature of its context. All soil was sieved with 5 mm mesh, resulting in large amount of very small shards being retrieved. All shards were examined for reconstruction. With the help of volunteer workers, the excavations produced several hundred reconstructed vessels (whole or partial) over the course of three decades (Ben-Shlomo & Van Beek 2014: 13). Already in 1989 Van Beek was able to demonstrate that total retrieval and maximum reconstruction brought about a considerable change in the results of archaeological research at Tell Jemmeh. The site had earlier been excavated by Sir Flinders Petrie (1853–1942). Petrie had excavated ten granaries and published 23 pottery forms, representing mainly small vessels and one jar fragment (Petrie 1928). Using total retrieval, Van Beek published results from one granary and one layer of ashy soil including 95 illustrated vessels. Van Beek was able to add 49 types to the assemblage, thus increasing the repertoire considerably. Also, many type definitions were refined, with more inner variation in the types (Van Beek 1989: 13–23). That the difference was due to the retrieval and reconstruction practices was demonstrated by counting the items that were found whole or nearly complete from the one granary excavated. These items would have included only six types (Van Beek 1989: 23). As to the advantages of total retrieval, Van Beek considered above all that it enables the elimination of retrieval based bias in the artifact assemblage, and that the larger amount of items provides more reliable data with more information on many themes, such as chronological, functional, and technical phenomena and their relations (Van Beek 1989: 25–26). As a drawback he considered the required resources: time, money, space, and personnel (Van Beek 1989: 28).

However, total retrieval has since been considered an ideal that for practical reasons is unfeasible. Magness-Gardiner describes total retrieval as an unfeasible ideal, due to the amount of material and the restrictions of resources, which force some level of selection (Magness-Gardiner 1996: 179, 191). The case study presented by Magness-Gardiner aimed at revealing the spatial organization, economy, and society at Tell el-Hayyat (Jordan), an excavation of a Middle Bronze Age village. The ceramic analysis focused on the functional identification and patterning of the functional groups at the site. At Tell el-Hayyat, the material to be studied in detail was selected. After cleaning, the ceramics were first examined to identify restorable vessels. If such were recognized, all shards were kept. If no restorable material was identified, all shards were counted and a selection was kept for further analysis. The selection included all shards that were thought of as "diagnostic of forms: rims, bases, handles, spouts, and sherds with surface decoration, as well as an equal number of body sherds and all EB [Early Bronze Age] IV ware. … All EB IV ware was saved as control for mixed loci because it is easily distinguishable from Middle Bronze Age ceramic material by its texture and color" (Magness-Gardiner 1996: 184). The process resulted in a sample of 23 000 shards, equating to 10–12 percent of the total amount of excavated shards (Magness-Gardiner 1996: 185). Schaub regarded total retrieval and maximum reconstruction as desirable for functional studies of pottery, but considered the methodology difficult for practical reasons (Schaub 1996: 231–232). However, total retrieval is not the only option to achieve reliable frequency data. The intensity of retrieval and the reliability of its representativeness can be increased with lesser resources as well. It is rather customary to estimate the amount of pottery by shard counts or weights (Orton 2000: 51). Estimating the relationship of all shards to the amount of original vessels is very difficult, and it has therefore been suggested that weights are more reliable when comparing sizes of pottery assemblages from different contexts (Orton 2000: 51–53). However, the weights between vessel types differ, so that the weights are not a reliable measure when comparing type frequencies in the same assemblage: many small vessels may weigh less than one big jar. It is also worth noting that it is often impossible to identify some shards, especially body shards, as belonging to a specific vessel type.

The retrieval of all rim shards is a more economical path towards achieving unbiased information on the pottery types present. For this frequency of data to be reliable, one needs to be able to estimate the relationship between the number of shards produced and the different types of vessels. It has been customary in Israeli excavation reports to present counts of complete vessels and rim shards (e.g. Mazar 1985: 21–22; Finkelstein 1986: 39; Hunt 1987: 140; Mazar & Panitz-Cohen 2001: 14; Zarzecki-Peleg et al. 2005: 235), or complete vessels and all diagnostic shards, which for the most part are rim shards (e.g. Bunimowitz & Finkelstein 1993: 81; Mazar 2006: 318; Mullins 2007: 392; Maier 2007: 243; Arie 2013: 478, 557). As the rim counts are a comparable measure of vessel quantities between different sites, I preferred to use them in this study as well, despite the discrepancy between the amount of rim shards and original vessels.

A systematic retrieval and retention strategy is a prerequisite for the proper use of statistical inference. This enables one to determine whether observed patterns in the material reflect real patterns, or if they might be incidental. In archaeological field reports, the use of statistics is often restricted to presenting the proportions of different vessel types, and changes in the frequencies between cultural phases. This kind of presentation is a compact and reader-friendly way of describing the material that has been kept and studied. However, it is not very clear how the given frequencies relate to the amount vessels of an ancient population of a given time period. A direct parallel between the assemblage kept and the ceramics used by the ancient population cannot be reliable if the retention strategy of the finds is biased (Van Beek 1989; Orton 2000: 2). Even in the case of formal sampling, the relationship between the sample and the original vessels is difficult to estimate (Orton 2000: 51–52). There are many issues that affect the frequencies of finds. The rate of breakage and discard affects the amount of items preserved in an archaeological context. Cooking pots and bowls, for example, typically have a relatively short lifespan. They are thus overrepresented in the archaeological record when compared to their frequency in the systemic context (David & Kramer 2001:100; Shott 1989: 14–15). The amount of fragments is also affected by the vessel shape: the wide forms will most likely fall in many rather small pieces when broken (Schaub 1996: 237). In the cultural sphere, some items are more likely discarded outside the living compound than others. In the natural sphere, some kinds of artifacts are more likely to disintegrate and perish. These kinds of processes and their systematics have been studied in ethno-archaeology and experimental archaeology (e.g. Schiffer 1987; David & Kramer 2001). Systematic retrieval allows the use of statistical modeling for type formation (Gilboa et al. 2004), or its use to solve stratigraphic questions (Fletcher & Lock 1994: 51; Shennan 1997).

1.2. Theoretical Framework

Every scholar is bound to his/her own background, which may be called their "theoretical framework" – by this term I mean the part of a person's worldview that relates to knowledge: notions of what can be known, what questions are relevant, and how we are able to answer those questions (see also Trigger 1989: 15–16). "What you find, archaeologically, has everything to do with what you look for, with the questions you ask and the conceptual resources you bring to bear in attempting to answer them" (Wylie 2002: xiv). Similar ideas have been expressed through the notion of the theory-laden nature of all observation in the study of history (Feyerabend 1975: 211) and in archaeology (Hodder 1999: 59–69; 80–104).

All knowledge is constructed upon pre-suppositions that guide the observations made when studying any material (Clark 2004: 12; Dilthey 1924: 336). The researcher interprets the sources at hand in light of the knowledge and beliefs adopted earlier. All scholarly work takes place in a hermeneutic circle wherein new insights are dependent upon earlier perceptions (Gadamer 1960). Historical knowledge is not *found* in archives, as Leopold von Ranke (1795–1886) believed (see Clark 2004: 9–10), nor does it *appear* from archaeological remains, as Hempel described (1958: 41); rather, it is an intellectual construction taking place in the present social setting of and around the scholar (Jones 1976: 296; Shanks & Tilley 1987: 7–28;

Clark 2004: 18, 65–68; Nissinen 2009: 486). The results of historical interpretation are tied to the aims and process of the research (Mink 1966: 77–79; Clark 2004: 32). Therefore, scholars should express their interests and be open about the difficulties of the process (Clark 2004: 76). Such concerns are at the core of advocating for the reflexive method as a way of working in archaeology (Hodder 1999: 80–103; see also Wylie 2002). As the process from data gathering to knowledge construction is the focus of this thesis, these aspects are especially important for me. I will return to the subject of my own scholarly path at the end of this sub-chapter.

The nature of the research problem itself, and the available source materials, have implications for the ways the problem can be approached through research. Thus, it seems proper to present the epistemological point of departure for my study. As material culture and the research process are both complex phenomena wherein many things affect each other, the construction of knowledge is also a complex process with few secure facts. The process is an interplay between induction and deduction. For the most part, it can be described as justified guessing as a means of reaching knowledge. Such a combination is also called *abductive* reasoning, rooted especially in the work of American philosopher Charles Peirce (1839–1914). It can be described as a more realistic or practical way of explanation than pure deduction or induction. It does not promise to reach any ultimate truth, but rather seeks for the best available reasoning, economical explanation, and probable solutions (Peirce 1958: 96–97; Grönfors 2011:17–20). I understand knowledge as a common, evolving construction process of scholars. Knowledge is produced, evaluated, and corrected within the academic community.

The Research Traditions in Israel-Palestine

All research stands in relation to some tradition. Field work and artefact study are parts of a process of research and interpretation within the tradition they stand in. The area of Israel-Palestine was one of the earliest places where archaeological investigations took place. Early geological and topographical surveys were carried out already in the 19th century by American and European scholars. Edward Robinson (1794–1863) surveyed in Palestine in 1838 (Robinson 1841–1842), followed by scholars from Europe in the following decades (Tristam in 1865, Conder in 1895). Grand surveys of Western Palestine were conducted by the British society The Palestine Exploration Fund in the 1880's. One major aim of these surveys was to identify biblical places (Robinson 1865; Tristram 1866; Conder 1895; Davis 2004: 4–12).

The study of the past in the region of modern Israel-Palestine has from its very beginning been tied to the study of ancient Near Eastern texts and history. The region was the stage for scenes "known" first and foremost from the Bible (see e.g. Macalister 1911: 297–299). The archaeology of Israel-Palestine, like Classical archaeology, has been able to make use of ancient written sources (Andrén 1997: 21–26, 58–63). The texts were often read as the key to the comprehension of the social reality behind the artifacts. The primacy of textual material has often led to a static and monolithic view of life, as demonstrated for the Roman world by Allison (1999b: 57–65). Texts emphasize the role of society's élite (Allison 1999a: 3), and Biblical material is fundamentally ideological in nature (e.g. Dever 1990). The privilege of having another source to the past has also been a trap for archaeologists unfamiliar with the problems inherent to the ancient texts. The ways of documenting an excavation and studying the materials unearthed has been guided by the available means of the day and by the question setting of the archaeologists, and in Israel-Palestine by biblical scholars as well.

There are two especially influential and still vital theoretical traditions in the archaeology of Israel-Palestine: the *culture-historical* and the *processual*. The background for the development of archaeology in Israel-Palestine has been based on historical and biblical research and the study of history. Philology and art history have been integral parts of the training of Israeli archaeologists at least until the 1980's. The culture-historical framework has dominated the field from the beginning (Bar-Yosef & Mazar 1982: 318). In this, the Israeli training followed the setting that was established by the European and American pioneers. Also, the tradition of the so called *'Biblical archaeology'* is culture-historical in its theoretical framework. This can be seen from its historical aims connected with biblical texts (in general, Davis 2004: 104; see also Wright 1947: 8, 16).

Culture-historical archaeology

Culture-historical archaeology evolved in the context of the rise of nationalism in Europe, when ethnicity appeared to be an especially important factor in human history. Great attention was paid to the geographical and chronological distributions of artifacts and their relation to specific ethnic groups. Human nature was considered conservative and biologically determined, and cultural change was explained by diffusion and migration (Trigger 1989: 148-151). The typological method, developed by Oscar Montelius (1843–1921) and Christian Thomsen (1788–1865), has its roots in this theoretical tradition. The link to biology was strong, both in its adaptation of Darwinian evolution theory and its use of the Linnéan classificatory system for plants. Series of regional chronologies were built by examining material from closed finds to determine what kind of artifacts occurred together. Cultures were defined on the basis of diagnostic artifacts, specific for a region and a limited time (Trigger 1989: 156-157, 170). The typological method, and especially seriation, was also used extensively in the archaeology of the Ancient Near East by e.g. Sir Flinders Petrie and William Albright (e.g. Albright 1932; Davis 2004: 70–71). Pottery was important because its stylistic attributes are sensitive indicators of change. It is most likely that the culture-history perspective will always occupy a part of archaeology, as often an archaeological study of a site produces "a story of the sequence of events and cultures" as its first phase (Kenyon 1979: 15). It is a valid and vital part of archaeological research and there is no reason to abandon it, but there are reasons to contest its dominant position.

For a considerable time, the framework of biblical stories about the Israelite people strongly informed the interpretations of archaeological remains carried out by both Jewish and Christian scholars. This connection was especially clear in the Biblical Archaeology school primarily connected to William F. Albright (1891–1976), Nelson Glueck (1900–1971), and Albright's student Georg Ernest Wright (1909–1974) (Davis 2004: 81–92; 102–104; Albright 1928; Glueck 1959; Wright 1947). Biblical Archaeology arose in the early 20th century and was the dominant framework of archaeological research in Israel-Palestine from the 1920's until the 1960's (Davis 2004: 94). Biblical archaeologists actively used biblical narratives to interpret archaeological remains, as illustrated by the following quotes:

> Ai was destroyed by the Hebrews as narrated in the Book of Joshua and never reoccupied in strict agreement with the Biblical tradition (Albright 1928: 8).

> It may be stated categorically that no archaeological discovery has ever controverted a Biblical reference. Scores of archaeological findings have been made which confirm in clear outline or exact detail historical statements in the Bible. And, by the same token, proper evaluation of Biblical descriptions has often led to amazing discoveries (Glueck 1959: 136).

The culture-historical approach has continued to be influential and serve significant needs up till the present day, and is socially attractive especially in the context of studying evolving group identities (Trigger 1989: 202–205, 244). Culture-historical research and a keen interest in the ethnicity of material culture have long been of vital importance in Israel, as they still are today (e.g. Münger 2013). The context of the newly established national state of Israel, founded in 1948, has been a fertile ground for research of the Iron Age, considered the period of the heyday of the Israelite kingdom under David and Solomon. In Israeli archaeology, the culture-historical approach has offered a link between the national state and its ancient past (Kletter 2005: 314–319; Kletter & Shaveh 2010; Kletter 2013; Andrén 1997: 61; Trigger 1989: 183). Reflections on political relatedness are usually absent from archaeological studies, and archaeology is not an exception in the field of humanities in this respect. The developing interest in the archaeologists themselves reflects insights brought about by the post-processual school of thought in Israel as well as in Europe (e.g. Shanks & Tilley 1987; Olsen 1997; Hodder 1999).

Processual archaeology

During the 1960's optimism in technical advances dominated the perspective of the western world, encouraging a revival of cultural evolutionism (Trigger 1989: 284; Johnson 1999: 22). The term "new archaeology" refers to approaches that reflected dissatisfaction with the culture-historical approach, not to a single set of beliefs or a particular theoretical conviction. Common traits were an ambition towards more *scientific and anthropological* approaches and an idea of *culture as a process* – hence the term *processual archaeology* (Johnson 1999: 20–25). Ecological adaptation was seen as crucial in explaining cultural differences; the environment was determinative to culture and cultural change (Trigger 1989: 290–292). Culture was seen as mankind's means of adaptation to the environment (Binford 1965: 204–205; Johnson 1999: 22–24). Emphasizing the scientific nature of archaeology involved striving for generalizations, modeling, and the intensive use of natural sciences. Modeling included setting up hypotheses and testing them, and the use of statistical tools increased (Johnson 1999: 26–30). This development was also enabled by technical advances which provided the necessary analytical tools. Although processualism advocated studying all aspects of cultural systems, the research focused strongly on subsistence patterns, trade, and social organization (e.g. Binford

1980; Trigger 1989: 327). Perceptions of culture were in many cases materialistic and deterministic. In Israeli archaeology, interest in economic and social questions started to appear in the field during the 1970's, for example in the excavation project at Gezer (Walker 1978: 2). The inclusion of anthropological aspects, as well as other influences of processualism, have increased since the 1980's (Bar-Yosef & Mazar 1982: 318).

Processualism encouraged the active use of science and anthropology, and the broadening of the material studied. In addition to pottery and architecture, the faunal remains and other kinds of refuse gained attention (Dever 1980: 46 –7). The archaeology of Israel-Palestine has been closely connected with studies of history and philology, and to a lesser extent has also been affected by methodological and theoretical developments elsewhere. The impact of processual archaeology was for a considerable time limited to the use of technical aids in data analysis (Hanbury-Tenison 1986: 108; Trigger 1989: 184; Andrén 1997: 46-47). As a result, the use of statistical analyses has become routine, as have scientific analyses of plant, animal, and human remains and the plotting of all finds in their contexts for spatial studies. Socio-economic questions (such as the use of space and subsistence patterns) first entered the archaeology of Israel-Palestine in the study of earlier periods, such as the Neolithic (Gadot & Yasur-Landau 2006: 584) or the Early Bronze Age (Philip & Baird 2000: 5–6), which did not have a connection to textual records and had less immense amounts of material. Later, such questions also entered the field alongside historical questions for the periods that can be linked with biblical sources. The theoretical issues have not been very actively debated in the archaeological literature in Israel-Palestine. Theoretical and methodological discussion has been largely absent in the last 20 years of journals such as *Tel Aviv*, *Israel Exploration Journal* or *Zeitschrift der Deutschen Palästina-Vereins*. The articles focus on chronology, culture, cult, ethnicity, and history.

For the artefact study, the trends of processual archaeology primarily meant an increased use of fragmentary material, such as shards, and their statistical and scientific analyses. The latter include studies of clays and provenance. Pioneering work in this tradition was carried out by Franken at Tell Deir ʿAlla, Jordan in 1960's (Franken & Kaalsbek: 1969), and for Eastern Terra Sigillata in the early 1980's (Gunneweg et al. 1983). Examples of Israeli archaeologists in this trend are Amihai Mazar, excavating at Tel Qasile (Mazar 1985), Dever working at Gezer (Dever, ed. 1986), and Finkelstein directing the excavations at Shiloh (Finkelstein, ed. 1993). A growing emphasis was placed upon artefact study, including detailed analyses of the shard material such as e.g. Patricia Bikai in Tyre in the early 1970's (Bikai 1978a and 1978b). These studies include systematic, intensive keeping strategies and the use of statistics. Rim shards were counted according to typological definition; these studies can be described as culture-historical and their use of pottery is fundamentally typologico-chronological.

Awareness of the wide range of formation processes started already in the 1980's within the framework of processual archaeology, encouraged by the work of Michael B. Schiffer (Schiffer 1987). The analysis of formation processes has since then became widely acknowledged, first in American archaeology and to a growing extent also in Israel (Gadot & Yasur-Landau 2006).

Processual archaeology has been accused of positivism, natural determinism, and imposing a passive role for humans. Post-processualism is a broad umbrella term covering a wide range of approaches. A common ground in post-processualism is the critique of the idea of objective, positivist science and the environmental determinism that often accompany scientific approaches. Post-processual archaeologists also share an intensive use of the social sciences and humanities. An awareness of the context of the research itself, and an interest in the philosophy of science in cultural studies, has grown (Hodder 1982, 1986; Shanks & Tilley 1987; Trigger 1989; Tilley ed. 1990; Herva 2008: 91). A consciousness of the ideologies behind archaeologists themselves and the modern contexts of research has recently also risen in Israel (Davis 2004; Kletter 2005; 2013). An understanding of the ideological nature of biblical texts has grown, and in general the use of biblical texts no longer plays a prominent role in current research (see e.g. Davis 2004).

Widely shared ideas include the view of data as theory laden, and the constructed nature of knowledge; the interpretative nature of all research; the active role of the individual; the idea that material culture not only reflects ideas and beliefs but is an active part of the world that is material, symbolic, and ideal; a fluidity of the meanings of things in different contexts and the awareness of the political context of research itself (Hodder 1999; Johnson 1999: 100–108). Differences between the approaches can be crystallized in the role of the human – both ancient and modern. The ancient human can be regarded either as more passive, behaving according to general laws, or more active in constructing the surrounding world. The modern scholar can be regarded as a recipient of knowledge, *finding* patterns that exist out there (culture-historical and processual traditions) or more actively *constructing* them (post-processual tradition). These options occupy a continuum, and both may be present in one study. The retrieval strategy is a part of a process, where the scholar actively constructs the material to study in the first place in order to communicate it to the scientific community.

My own profile

Personally, I have during the study of the Tel Kinrot pottery lived through all of these approaches, and I am still engaged with all of them. I started working within the culture-historical setting. My initial interest was in looking for minor differences indicating chronological change, and similarities reflecting cultural connections to other sites in the region. Feeling uncomfortable with the different and often blurred pottery representations, and the intuitive nature of pottery types, I started working with statistical tools, expecting to arrive at more objectivity and "hard facts." Later, I was disappointed when faced with the manipulative possibilities of statistics and the need for interpretation in the reading of statistical results. I realized that one is incapable of knowing beforehand what kind of features turn out to be interesting or significant, and the need to rely on inherited wisdom to decide what features to measure and on what scale. I also discovered that the possibilities for finding chronological differences within the Tel Kinrot material were restricted due to stratigraphic reasons.

The original culture-historical and descriptive task started to seem inadequate to me, as it did not include an articulated problem to solve – a prerequisite of a proper study according to

Lewis Binford (1972) or Martha Joukowsky (1983: 3). The task was only to describe differences in detail, not to explain them or make generalizations about such differences. At that point, the difficulties that I had faced when writing descriptions based on two assemblages of pottery, which were both very similar to and very different from each other, started to intrigue me. The ceramic material was from the same site and from the same period, with many items that were very similar to each other in their shape, size, and clay material. At the same time, the assemblages were different to work with, and this difference related to the different amount of items and their state of preservation. The difference between the assemblages of the Tel Kinrot pottery I worked with raised an interest in methodological issues concerning the whole process from excavation, finds retrieval, sorting, categorizing and measuring, to the analysis and presentation of the material and its interpretation in publications.

While admitting that statistics did not provide absolute answers, I still find their use helpful in many respects. Advanced heuristic statistical tools with sensitivity to the multidimensional nature of archaeological materials can offer a practical tool to describe phenomena in a compact way, and to gain insights into masses of material that would otherwise be hard to reach. However, it is important to acknowledge that the selection of recorded details inevitably guides all the following analyses. Therefore, the recorded features need to be selected carefully, and grounded on relations between the features and target inferences (e.g. Schaub 1996: 234; Orton 2000).

In order to find a reason for the difference between the two assemblages, I turned to the field documentation, trying to see what kind of a role the pottery played there. I made observations concerning information therein about the pottery, which mainly indicated the periods that had been identified in each collected basket from the excavated contexts. In addition, there were notes about whether the material was kept for restoring, if there was pottery kept, or if material was discarded. However, the information gained from the field documentation concerning pottery retrieval turned out to be thin. The idea of including interviews came from the directors of the KRP, Stefan Münger and Jürgen Zangenberg, in May 2012. After some hesitation I decided to adopt it, though it meant diving into a methodology I was unfamiliar with. The addition of the analysis of the documentation and the interviews to the research process reflect a constructivist conception of knowledge typical for post-processual thinking.

1.3 Sources and Methods

The core of this study is a comparison between two pottery assemblages that derive from one settlement phase at Tel Kinrot, and thus from the same archaeological population. The pottery material is a single assemblage on one hand, and two assemblages on the other. This is because two sub-assemblages are constrained by the different field and recording processes. The material available to compare are the retrieved and kept artefacts, their documentation, analyses, and interpretations. There are different bodies of sources used: 1) the pottery material, 2) its documentation, 3) interviews of involved people, and 4) the published articles presenting the results of the excavations. In addition, I have performed statistical analyses with the systematically retrieved pottery of the excavations of the Kinneret Regional Project (2003–2008). The applicability of posing different kinds of research questions with material retrieved in different ways will be an essential part of the evaluation of the two projects.

With the word “method” I understand the way of going towards a destination, according to the Greek *μετά ὁδός*. The method is dependent on both the goals and sources used. In this study the primary method is *comparison*: two different pottery assemblages, the selection making processes behind them, and publications discussing pottery are first described in detail and then compared. Because different source materials require different methods to be used, the methods will be discussed separately for the four bodies of source material, when presenting each source material.

Source Material 1: The Pottery

The primary source material is **the pottery** itself. What has been kept and recorded can be seen from the assemblages themselves. This material can be analyzed, and the assemblages retrieved by Fritz in 1994–2001 and by the KRP in 2003–2008 can be compared with each other. In addition, the material retrieved from 2003–2008 needs to be divided in two, according to two diverging strategies of pottery retrieval. The question of what was discarded is more problematic. To some extent it can be deduced from the pottery material itself. As the assemblage from 1994–2001 consists of mainly well preserved material, but the assemblage retrieved in 2002–2008 mainly includes shards, one can conclude that the material of more modest preservation was to a larger extent discarded or left unrecorded in the earlier project. This can be further corroborated with the documentation in the locus cards (chapter 4), or by looking at the excavation dump.

The primary archaeological material of the study comprises two groups. The first group consists of material excavated from most of the excavated areas on the Eastern slope of Tel Kinrot, mainly consisting of domestic architecture (Fig. 1.2; a map of the whole tel is in Appendix 1). These areas were mainly excavated under the leadership of Professor Volkmar Fritz from 1994 to 2001. The strategies for the recovering and recording of finds followed a traditional, selective agenda common in the archaeology of Israel-Palestine, keeping mainly complete, nearly complete, or full profiles of vessels and shards that were for some reason thought to be of special importance. In addition, a rather intuitive collection of typical shards was kept from important loci, though not recorded in detail.

The other group is defined by two areas on the slope excavated by the KRP, namely areas U and W. Area W is located at the north-western end of the larger, excavated fields on the slope, and is physically connected to area K on its south-eastern side. Area U is located in the middle of the excavated areas on the slope. It is physically connected to areas N, S, and J on its north-western, northern, and eastern sides. These two areas were excavated in 2004 (Area W), and 2003–2005 and 2007 (Area U). These excavations took place after a change in the excavation team, when Münger, Pakkala, and Zangenberg replaced Fritz as excavation directors. The strategies for recovery and recording were modified. All the rim shards of pottery were kept and recorded. The full amount of pottery was weighed to give an idea of the whole amount of material, but the body shards were not counted. Body shards that were considered special (decorated pieces, special wares) were kept and recorded. The strategy remained the same in all excavated loci in these areas, except the surface survey and topsoil material. These contexts were kept in the described manner only in one square in area U, to give an impression of the nature of these mixed contexts near the surface (the rim shards were counted, however). In other surface layers, the retrieval strategy was similar to the strategy used during the Fritz excavations, like the other areas excavated by the KRP (see chapter 4).

It is vital for the use of statistical analyses that the recovery and recording of the studied material is systematic. All selection strategies create some kinds of samples from a larger set of material. In statistics, *sampling* refers to the strategy of making the sample: if the sample is used to make inferences from the original population (all material), the sampling has to be representative of the population. Usually this is achieved by random or systematic sampling (Doran & Hodson 1975; Shennan 1997: 361–362, 373–388; Orton 2000; Shafer 2009: 25–40). The intensive retrieval strategy of analyzing all rim shards can be regarded as a systematic sampling. In this case it is possible to assume a constant relation between the rim shards studied and shards *excavated*. The original pottery used and discarded by the ancient people would be a different unity, due to differences in excavation areas, discard patterns, and other formation processes, such as later land use (e.g. Schiffer 1987).

The areas (N, J, R, and S) that were started by Fritz and finished by the Kinneret Regional Project from 2003–2008 form a group situated between the two approaches. They are treated here as part of the KRP campaign, but as a separate group within the KRP. In a way, they form a transitional phase between the two strategies defined above. The retrieval strategy aimed at keeping some *typical* items from each archaeological context, and was thus in line with that in use during the Fritz excavations, while the field work methods otherwise were adjusted similarly to the areas with intensive retrieval strategy.[1]

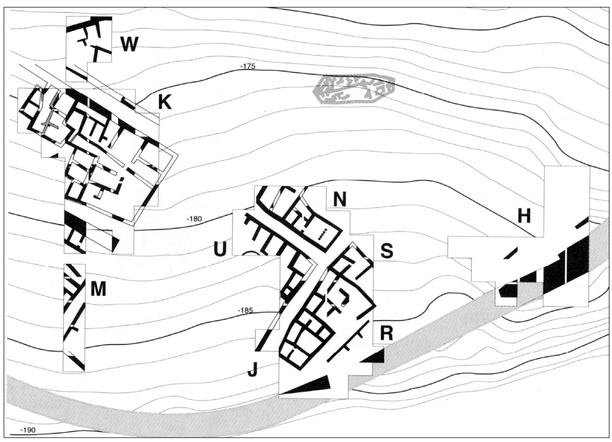


Fig.1.2 The architecture of the Early Iron Age on the southeastern slope of Tel Kinrot. The thick grey line presents the city wall partially excavated and partially reconstructed according to surface survey. Drawing by Axel Maurer & Stefan Münger, © KRP

I have studied the pottery with typological, descriptive method, and quantitative tools. I present traditions of field work and artifact

[1] Professor Volkmar Fritz (1938–2007) left the excavation lead after the 2001 field season due to a severe illness. He could not conduct the publication process of the excavation project started in 1994 as planned. The publications have been prepared by Dr. Stefan Münger, Prof. Jürgen Zangenberg for the Iron Age, and Dr. Juha Pakkala and Prof. Wolfgang Zwickel for the Bronze Age.

study in Israel-Palestine briefly in chapter 2.2. The typological method common in artefact studies is discussed in chapters 2.3–6. In addition, the typology construction of Tel Kinrot pottery is discussed in chapter 5, before the presentation of the pottery material. I present the Early Iron Age pottery of Tel Kinrot as one assemblage in chapter 5.2, as a typology including reflection on the process. As the pottery from the KRP (areas U and W) has also been studied in quantitative terms, statistical tools are explained in the context where they are discussed in more detail (chapters 2.7 and 5.3). I have used statistical tools as heuristic devices and for testing whether the differences between materials forming different stratigraphic sub sets of the ceramic assemblage are significant, or if they might be incidental (chapter 5.3).

Source Material 2: The Field Documentation

The retrieval practice can be followed in the **field documentation**. The retrieval action is recorded in the field documentation. The first selection (what was kept and what was discarded) has taken place during an examination of material in the field. As to the Fritz project, the first selection was marked on the basket list and transferred to the locus cards. In the documentation of the KRP, a table of each field reading included the recording of the retrieval action for the basket. In the documentation system of the KRP, both locus and basket cards (digital layouts) were expanded in detail compared with the Fritz documentation.

The field documentation serves several purposes, and includes many kinds of information. There are notes, remarks, sketches, working plans, and the interpretations of the excavator. It is provisional and tentative in nature. It is not meant to be published as it is, but serves as a recording tool and a place of reflection for the field archaeologist while he/she proceeds with the excavating. Together with the field reports, it also serves as the basis for the final report and interpreting the results. Field documentation includes many themes that are not focal for the selection process of the pottery. However, it needs to be acknowledged that the parts concerning pottery retrieval are a part of a larger system. The excavation can be described as a holistic process with intertwined aspects of material culture remains. In this study, the field documentation is used only to the extent that it is needed to understand the differences that appear in the pottery assemblages. Therefore, its use is in some sense fragmentary, and the emphasis is on "raw data" like counts or weights of the pottery, notes of the "field reading", and the chosen retrieval action.

Fritz had expressed his methodological principles in a study book *Einleitung in die Biblische Archäologie* (1985, revised English translation in 1994). Methodological decisions in line with these principles are visible in the excavation report of Kinneret I (Fritz 1990, see chapter 3.4) and in the field documentation of 1994–2001 (chapter 4). Comparable published statements from the KRP do not exist. Locus definition principles and artifact retrieval strategies at Tel Kinrot were discussed in 2003 in detail, as the documentation system and retrieval strategies were renewed. The decisions of the principles lay primarily with the excavation directors, in discussion with the field staff. The practical decisions were made by the area supervisors. Field work always requires adjusting to the situations encountered during the actual work. The definition of a locus could affect the amount of kept material. Because of this pre-understanding, I analyzed the differences between the locus-definitions in the field documentation. However, it turned out that the physical size of the locus did not have a strong an impact on the amount of material kept. The second selection point – what was selected to be analyzed in detail – turned out to be more relevant for the formation of the pottery assemblages. Regarding the decision concerning the pottery retrieval, I was involved myself. The differences between the Fritz and KRP retrieval strategies are discussed in chapter 4.

This study is focused on the *way of constructing* the knowledge and the archaeological interpretations, as much as of the results reached. Description aims at a fair reading of the objects of study. I have tried to take into account that field recording is provisional, and not to be read as if it was a final report of an archaeological project. The documentation forms indicate what kinds of features have been regarded as especially important. The forms guide the work of the excavation registrar as well as that of the area supervisors. The projects need to be set in their own frameworks, of the archaeology of their time. The field documentation needs to be read taking into account its provisional and practical nature. In order to reach the practice of constructing the knowledge in the pottery study I considered it essential to include observations on both the pottery documentation forms and their practical use.

Source Material 3: Interviews

As documentation about the selection process for the pottery is scant, **interviews** of people engaged in the field work during these seasons provided an additional source of information. There are a few problems with this source. The first is that the temporal distance between the 1994–2001 excavations and this study is considerable, and may affect the ability to recall details of field work. Their accuracy is also difficult to evaluate. It becomes especially challenging to remember processes if they were unstable.

The interviews provide a different body of material compared to the other sources. There are also practical questions regarding the selection of the people to interview: who should be interviewed and on what grounds? In this study, the interviews are a source of supplementary information, and they thus have a fact-finding role. The people chosen to be interviewed are therefore not meant to be a random sample of area supervisors or even "typical" ones. Rather, I preferred to interview few but well informed people with some education in archaeology, and who had taken part in several field seasons. The following people were interviewed: Anke Welzel, who worked as finds registrar from 1994–1999 (May 2013); Stefan Münger (March 2014), Axel Knauf (April 2014), and Merja Alanne (April 2013), who all worked as area supervisors during at least two seasons and had archaeological training at some academic institution. In addition, I interviewed Pekka Särkiö (April 2013), who worked as a square supervisor in 1998. He had previous archaeological experience in Israel, but his duties concerning documentation were few and his perspective on the excavation documentation is therefore closer to that of the volunteer students. His interview worked for me as a pre-test before interviewing the more crucial informants. As to its content, this interview is supplementary to the more detailed ones with the people of the more permanent staff. A short interview of a volunteer student from the 1998 season, Martin Hallaschka (September 2014), was also included in order to see how well it was in line with the other information received. It did not include new information, but confirmed the previously gathered information with less detail.

Since detailed information was desired, I preferred a semi-structured interview, as it allows the interviewees to not only answer direct questions but also to freely produce ideas about the theme of the interview, thus producing broad and detailed information (Hirsjärvi & Hurme 2008; Kvale 1996: 124–143). I was aware that I might not know beforehand what aspects would appear to be important. Therefore, I chose themes that I supposed to be relevant and asked the informants to tell me about the field work, documentation, field reading, and the work with pottery without restrictive questions. I asked about the background information of the participants in a more detailed way (e.g. when each person took part in the project). Four interviews were made in person (Särkiö, Alanne, Welzel and Hallascka), and three over Skype (Münger twice, Knauf). All of the interviews were recorded, but one recording file was defective (the first interview of Münger, of which I have notes written during and immediately after it, supplemented on the next day). I transcribed the recordings, except for the last interview of Hallaschka, which was short and did not include new information. The set of the themes of the interviews is provided as Appendix 2A (English version).

Source Material 4: The Publications

Publications: The published articles can be regarded as examples of presenting the evidence and interpretations so far. Volkmar Fritz published several articles on Kinneret concerning the excavations on the acropolis, as well as on those of the excavations on the slope. For the latter project, several articles were jointly written with different partners (see chapter 4). The articles include short notes, popular presentations, and research articles.

The pottery types, their indicated functions, and chronological or cultural relations are an integral, practical part of the study. The formation of the typology is artifact study *par excellence,* that is affected by the retrieval process and the chosen analytical methods in a specific way. The typology is an object of study, but at the same time it is a result of the work with the ceramic material. The pottery typology thus has a double role. This requires a description of the process of typology building, combined with a theoretical discussion on typologies in general and in Israel-Palestine in particular. The pottery typology (chapter 5.2) is planned as a part of the site report for Kinneret II presenting the Iron Age remains, edited by Jürgen Zangenberg and Stefan Münger.

As the process of artifact study is being focused upon, the work includes a fair amount of reflection upon my own work. This has posed a special challenge, as reflection seems to lack the standards of scientific rigor. It also seems to offer a fair amount of blind spots for any researcher. Reflection is a concept that is foremost rooted in the work of Donald Schön (1930–1997) in the field of education. It refers to a mental process were complicated or unstructured material is reprocessed in order to better understand it, gain deeper insights into it, or create new applications for previously learned ideas – intuition made explicit (Schön 1983: 49–69;

Lahtinen & Toom 2011: 32–34; Moon 2011: 1–2). Reflection has been called for in archaeology in general (e.g. Hodder 1999; Wylie 2002), and in artifact study in particular (Langin-Hooper 2011). Reflexivity can be linked with feminist critiques on knowledge production “encouraging self-awareness both about how we reach conclusions and about the broader relations between knowledge and knowledge-makers” (Gero 2007: 312).

The sources are thus: 1) the pottery assemblages; 2) the field documentation concerning the keeping and analysis of the pottery; 3) the interviews of selected participants; and 4) the published articles. The pottery is the starting point of the differences in the retrieval strategies – the differences between the kept materials already reveals interesting insights. Reconstructing the process requires other sources than pottery alone be used. The field documentation provides information about the contexts from which the material was discarded, and the chronological periods present in those contexts. The interviews add information about the selection process.

Chapter 2 Research History and Pottery Studies

2.1 Research History of Field Work and Artifact Study

Traditionally, the field work is not described in detail in published excavation reports. In the reports, the field work is customarily documented very briefly and on a general level, if at all. Field work practices, organization, documentation, and artifact treatment are discussed in manuals on archaeological excavations, but their genre is determined by their purpose of training archaeologists (e.g. Dever & Lance 1978; Joukowsky 1980; Fritz 1985; Barker 1993; Roskams 2001; Hester et al. 2009). The principles described in study books are commented upon in a few excavation reports (Ussishkin 2004, Sharon 1995), but they focus on stratigraphic issues. There are not many excavation reports that have discussed the process of the field work and artefact analyses. Descriptions of the processes of selecting the finds have been included in reports of Qasile (Mazar 1985), Megiddo (Arie 2006), and Timnah (1997, 2001 and 2006). A description of some detail appears in the repot from Tel Dor (Sharon 1995).

The actual field work has been discussed in some recent publications, mainly in the British tradition. An anthropological perspective on archaeological practices related to pottery was published in a short article by Holtorf (2002), while more work has been published relating to field work (Hodder 2000; Edgeworth 2003; Edgeworth, ed. 2006; Moser 2007). A short history of the ethnographies of archaeology is provided by Edgeworth (2006). A monograph on fieldwork and archaeological knowledge construction derives from the German field of prehistoric and Near Eastern archaeologies (Davidovic 2009). A collection of articles on the history of archaeological practices from the days of antiquarianism until the 1960's also focused on field work and the social organization of archaeology as an academic discipline (Jensen, ed. 2012). I was not able to find ethnographies of archaeological practices related to archaeology as practiced in Israel-Palestine.

Excavation reports are often published a considerable amount of time after the excavation. As a result, the field methods described in the final reports give a picture from a situation of over 10 years before the publication (e.g. Timnah, Tel Beth-Shean, Yoqne'am, Tell Qiri and Hazor III-IV). There are exceptions to this general trend of considerable delay: the first reports of Hazor, excavated in the 1950's (Yadin 1958, 1960), reports of the Qasile excavations in 1971–1972 (Mazar 1980, 1985), the report of the Tell Keisan excavations in 1971–1976 (Briend & Humbert 1980), the report on the Kinneret I excavations of 1982–85 (Fritz 1990), and the Dor excavations in 1980–1987, Part I (Stern 1995) were all published within 5–13 years from the excavations. Also, the policy of the renewed Megiddo expedition has been to publish reports within 8 years of the excavation. Many excavation projects span over decades, such as the renewed excavations at Hazor in 1990–2009 (Ben-Tor et al. 2012), Lachish excavated in 1973–1994 (Ussishkin 2004), or Tell Abu al-Kharaz excavated in 1989–2012 (Fischer 2013). In such cases, one may suppose that the field work is adjusted and improved during these long-term projects. There might not be a single field method, but rather a palimpsest of methods, as mentioned by Campbell in the introduction of the final report on the Shechem III – site excavated in 1957–1972 and published 29 years later (Campbell 2002: 5).

Even the definition of such a central concept as *locus* is quite rarely stated clearly. Exceptions are e.g. the report of Tel Dor (Sharon 1995), an article about the Middle Bronze Age village of Tell el-Hayyat (Magness-Gardiner 1996), and a general account from the excavations of the Neolithic site of Sha'ar Hagolan (Garfinkel 2004). The term *clean locus* refers to a locus of chronologically homogeneous pottery finds. In most cases they can be interpreted as *primary loci*, i.e. floor deposits or debris of a single activity which remained at the spot of the activity. Many of such homogenous assemblages are *secondary* in nature, like rubbish pits that include discarded artifact from the cleaned floors or other activities dumped in the vicinity of the action that produced the remains. Primary deposits are usually favored by archaeologists, because they are directly linked to the activities in the past. However, the secondary deposits may have a great value when analyzing the activities of the studied area (Magness-Gardiner 1996: 183). The locus definitions used at Tel Kinrot are described in chapter 4.

The Selection of Pottery Finds Discussed in Excavation Reports

Different materials and periods are often treated in different ways. This study focuses on the processes in Israel-Palestine for the Iron Age assemblages. In the study of the Early Bronze (EB) Age period, the ceramic assemblages have been characterized more by shards rather than full forms, and thus other aspects than the vessel form were considered earlier – even though the study of EB ceramics was also dominated by shape and a few distinctive wares in the early 20th century. The call for explicit recording procedures, quantitative data, and the use of statistical tools for ceramic studies gained traction first in the study of EB materials (Philip & Baird 2000: 4–5; Dessel & Joffe 2000: 41-49).

If the documentation of field work can be regarded as poor in general, the retrieval policy of pottery finds is described in some recent reports in more detail. It is often presented before a type-series of the ceramics. The section informs the reader of the prehistory of the material presented. The treatment of finds in Timnah is described in five pages (Mazar & Panitz-Cohen 2001: 10–15). In the pottery reading, a date was entered for each basket. When more than one period was represented in a basket, the main period was recorded first, followed by the others. This indicates that shards were not counted. Each pottery basket form included a code indicating the retrieval policy of the material. The possibilities were four: 1) loci with no restorable pottery but considered stratigraphically important, with all rims and diagnostic shards kept; 2) loci lacking stratigraphic value (e.g. topsoil), of which all shards were discarded; 3) restorable loci, from which all the pottery was kept and sent for restoration; and 4) "waiting" loci, which were set aside pending further excavation that would hopefully clarify the nature of the locus (Mazar & Kelm 1997: 16–17). It is not indicated if group 3 also meant that rims and other diagnostic shards were in the end kept, which seems to me a reasonable expectation. The "waiting" loci most likely were considered anew already during the excavation, and re-categorized as group 1, 2, or 3. The discussion about the stratigraphy and architecture includes a description of finds only in cases of *stratigraphically clear loci with a homogeneous* *pottery assemblage* (of a single period), like Buildings 743 (Mazar & Kelm 1997: 205–211), the Oil Press Building 950 (Mazar 1997: 211–218), or Buildings F608 and F607 (Copland & Mazar 1997: 239–244). The finds and their distributions are described in detail in report II (Mazar & Panitz-Cohen 2001). The pottery keeping policy was “to keep all rims and a selection of other diagnostic shards, and all the pottery from loci that appeared suitable for restoration” (Mazar & Panitz-Cohen 2001: 10). The study of the pottery focused on form, fabric, and surface treatment. These aspects were registered for all diagnostic vessels and shards from well-defined loci. Material from some poorly stratified loci, such as constructional fills, was registered as well in order to build up a comparative data base (Mazar & Panitz-Cohen 2001: 11).

The keeping policy for the pottery at Dor was similar: a preliminary identification and dating of the material was done during the field season. One to three periods present were marked on forms – if more periods were represented, the basket was considered mixed and the periods were not further defined in the forms. After this preliminary reading, four strategies were used. Baskets from unstratified loci were discarded, as well as ones from loci which did not contain enough pottery to merit further processing (Category 0). A selection could be saved from unstratified loci, if the material was considered interesting, e.g. a typologically new form was identified (Category 1). From “clean” loci, all pieces considered indicative were retained. The shards included all rims and some handles, bases, and decorated shards. In such loci even body pieces could be saved, if there were few indicative shards (Category 2). The fourth possibility was when there were pottery collections fully retained in order to restore vessels (Category 3) (Sharon 1995). It is not explicated what happened to the material of baskets of Category 3 after the restoration was completed, but most likely the material was treated according to the locus definition as Category 1 or 2.

At the renewed excavations at the Megiddo Early Iron Age levels (K-5 and K-4), all rims and decorated shards were retained. The level K-4 was found covered by considerable debris of a violent destruction, leaving behind a vast amount of complete vessels. From this level, all rims were counted from only two well-preserved areas of a Courtyard Building 00/K/10. From other loci, the analysis was based on complete forms and large fragments. In contrast, from the meager finds of the earlier level K-5 all rims and decorated shards were counted. The type-series for the Iron I material was based on all types encountered in *clean loci* in the renewed excavations in areas K, F, and L, and the complete vessels of the earlier excavations of the University of Chicago (areas AA and DD) in the 1930’s (published mainly by Loud in 1948). The type-series was then also used for sorting the about 1000 shards from levels K-4 and K-5. The typology followed principles used at selected other sites, namely Tell Qasile (Mazar 1985), Yoqne’am (Zarzecki-Peleg 1997), Dor (Gilboa 2001), and Dan (Ilan 1999). In the typology for the Iron I pottery from Megiddo, Arie limited the amount of types and sub-types despite the diversity in some vessel types. A decision to make comparisons with established types rather than single vessels makes the discussion easier to follow. However, it gives a uniform picture of the comparable materials, which often are very diverse (e.g. Arie 2006: 191–192; 192–219).

2.2 Field Methods and Retrieval Strategies in Israel-Palestine

The archaeologists in the Near East have long been preoccupied with chronology. The site reports in general, and pottery studies in particular, reflect this chronological interest. A similar phenomenon has been described for Roman pottery by Peacock (1982: 1–4, 160–165; Ault & Nevet 1999: 43–45). Documentation practices that were suitable for chronologically and culture-historically oriented work may be barren ground for socially oriented questions concerning the life ways of common people, their subsistence patterns, the production of their daily equipment, or space use in their homes. Retrieval and recording practices are a part of a larger system of field archaeology including excavation strategy, management, organization, storage, and many other aspects and practicalities. In order to set the work with finds in their proper context, a look at field methods is needed. However, the topic is broad and I will treat it here only on a general level. Field methods in Israel have been summarized by Kletter (2015).

Archaeological methods for excavating and recording have followed different paths in different regions around the world. This is also the case in the Levant – a region with a long history of excavations. Over the history of research in the region, there is a trend of recording more details, keeping more fragmentary finds, and excavating less cubic meters. This is well illustrated at the sites with renewed excavation projects like Megiddo (Loud 1948; reports edited by Finkelstein et al. 2000, 2006 and 2013), Beth-Shean (Rowe 1940; Mazar 2006, reports edited by Mazar et Mullins 2007; Mazar & Panitz-Cohen 2009), and Hazor (Yadin 1958, 1960; Ben-Tor et al. 2012). This trend has been generally accepted. The recording and retrieval strategies have been the focus of only a few studies – which is surprising when one thinks of their importance for all materials under archaeological studies. Davis (2004) has provided a general overview on the field work and historical interpretation. In a short article on field work, Wright insightfully noted that “What excavators are trying to do and what they do are not identical and neither may mirror what they say they are doing” (Wright 1966: 115). Though he wrote about excavation methods, the same can be said of retrieval strategies as well.

Stratigraphic Excavation Traditions

There are two main traditions of stratigraphic excavation in Israel-Palestine: 1) *the Architectural* or *horizontal,* so called “locus to stratum” method of the large excavations of the British Mandate stage of Palestinian archaeology common from the 1930s to 1950’s, and the 2) *Wheeler-Kenyon, vertical* or “earth to layer” system, used in Palestine from the 1950’s on. Excavations in Israel have sometimes been considered as using the “Israeli system” of excavation, coined after Yohanan Aharoni’s article (1973). However, this system is not a distinctive method, but rather a tradition of combining architectural and stratigraphic excavation methods (Kletter 2015). The excavations at Tel Kinrot also follow the tradition of combining these two methods.

In the *architectural* tradition, the strata or levels were defined by architecture and the focus of practical work was in exposing complete horizontal units (Loud 1948: 1; Ussishkin 2004: 40–41). The method has also been called the "Locus to Stratum" method because the loci are the basic units. Architecturally connected loci, and loci with typologically similar finds, are considered as representing the same stratum (Wright 1966: 120). A *Locus* would usually be a room or a courtyard of an architectural unit. This kind of tradition is exemplified by the excavation reports of *Beth-Shean I* and *II* by Alan Rowe (1940 and 1930) or *Megiddo I* by Robert Lamon & Geoffrey Shipton (1939) and *Megiddo II* by Gordon Loud (1948). The large scale excavations of William Albright in the early part of the 20th century also belong to this tradition (e.g. Albright 1926). Later representatives of the horizontal method can be found in the work of Yigael Yadin at Tel Hazor and Yohanan Aharoni at Tel Beer-Sheba (Ussishkin 2004: 41, Bar-Yosef & Mazar 1982: 314). These excavations aimed at large scale clearance of the Near Eastern tells stratum by stratum, originally even in their entirety (Lamon & Shipton 1939: xxiii). This was hampered by the financial limits of the expeditions (Loud 1948: 1). In this tradition, *locus* numbers were assigned to structures or parts of them, leaving parts of the excavated materials outside any loci. Thus not all finds could be assigned a definite locus: those were registered with a reference to a near-by locus or a square of excavation and a stratum (Lamon & Shipton 1939). The incomplete stratigraphic definition of the loci was to some extent compensated for by the large amount of finds from these excavations (Bar-Yosef & Mazar 1982: 311).

The Wheeler-Kenyon or "vertical system" is the other influential tradition in Israel. It was developed by Mortimer Wheeler in the 1930's in Britain, and further refined by his student Kathleen Kenyon. Their work provided two fundamental ideas for stratigraphic work: the value of the interfaces of the identified earth layers, and the numbering of all the layers. The latter assures that all objects recovered during the excavation will be given a provenance (Harris 1989: 11).

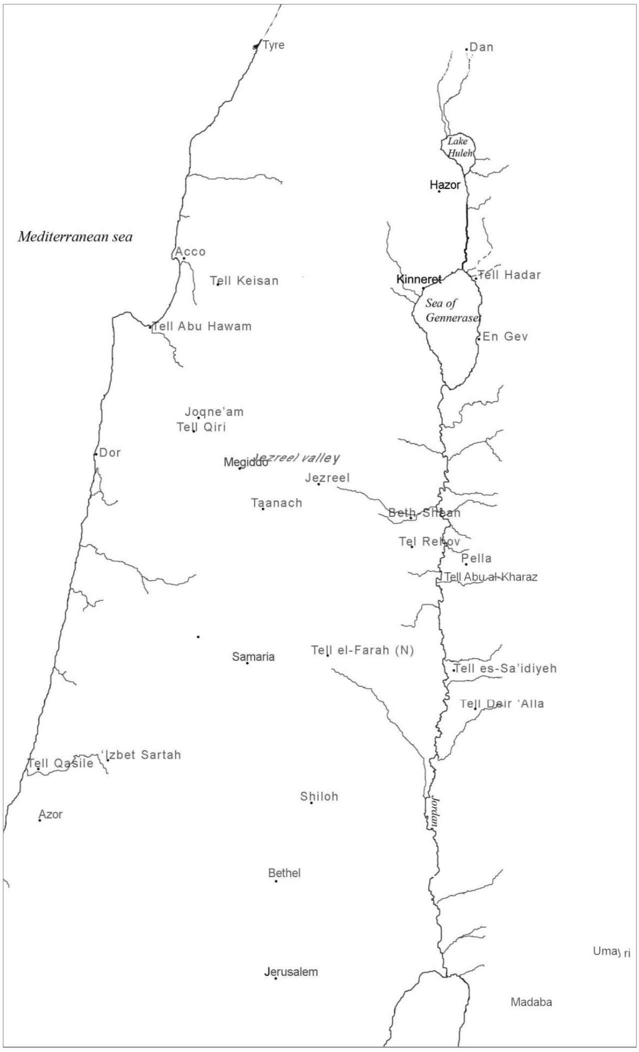


Fig.2.1 Iron Age sites in Israel-Palestine. Map by TT.

The Wheeler-Kenyon method pays the foremost attention to the layers of soil. This is done both when digging through them, and looking at the sections formed by the balks left standing during the excavation. The layers are identified by observing the color, consistency, and texture of the soil (Kenyon 1961: 76). The same principle of stratification is applied to features like pits, banks, or trenches that do not form layers, but represent other kinds of man-made disturbances of the soil (Kenyon 1961: 69). This tradition has been followed especially in excavations of the earliest periods like the Neolithic site of Sha'ar Hagolan (Garfinkel 2004: 27), at Tel Dan for the Neolithic (Gopher & Greenberg 1996: 67–68) and Early Bronze Age phases (Greenberg 1996: 86–96), and at Khirbet Hamra Ifdan in Jordan (Adams 2000: 379–383). The early periods tend to have little and scattered architecture, making the architectural tradition unsuitable. The Gezer excavations followed the stratigraphic method of Wheeler-Kenyon (Holladay 1978: 59–72; Lance 1978: 74–88; Dever 1978: 140–141), and the manual by Dever and Lance promoted the method. In the excavations of Tel Dor this tradition has been followed through all the periods excavated (Sharon 1995: 13–14). The principle of following earth layering and using the sections to control between the earth layers has been widely adopted in Jordan and Israel since Kenyon's work (Dever & Lance, eds. 1978; Dever 1980: 44; Bar-Yosef & Mazar 1982: 313).

The most common way of digging in Israel since 1960's can be regarded as a combination of the architectural and Wheeler-Kenyon traditions (Bar-Yosef & Mazar 1982: 315; Kletter 2015). The method described in the excavation report of Tel Beer-Sheba I (Aharoni et al. 1973) is mostly in line with the architectural method. A *stratum* is defined as all the layers belonging to a certain occupational phase, like the fill beneath the floor, the floor itself, the debris on the floor, and the accumulation of soil. The material lying on the floor is considered of special importance, as the most reliable material of a stratum. Basically, a stratum in this tradition is defined *architecturally*. A *Locus* is "any defined area of the excavation from which the finds are recorded; i.e. usually rooms. Installations or pits inside a locus may or may not receive special loci number, depending on the considerations of the area supervisor" (Aharoni et al. 1973: 119). A new locus should be started when a floor is removed or walls appear (Aharoni et al. 1973: 119–120). At Beer-Sheva, Volkmar Fritz worked as a field supervisor during the 1970 and 1971 seasons, receiving there his initiation into archaeological field work in Israel.

Retrieval strategies and pottery presentation

The presentation of the pottery from the early, large scale excavations of the architectural tradition, like Megiddo and Beth Shean, is qualitative and typological: well preserved vessels are presented in the plates by selected drawings. In the Megiddo II report, most of the pottery types are presented by one drawing (of the first specimen found), and this "type pot" is repeated for all strata in which the type was found (Loud 1948: no page). A similar practice seems to have been followed for the Beth Shean pottery by Fitzgerald (1930: 3–6). The published pottery naturally portrays a small fraction of the originally excavated ceramics, but the strategy of selection making was not explained.

Kenyon opted for a more intensive keeping policy and documentation of pottery (Kenyon 1971). A significant difference from the horizontal tradition is the care taken in recording the shard material. She insisted on keeping all *significant* shards, basically all the rims and decorated shards, in addition to the restorable vessels. In addition, a few characteristic handles and bases, or samples of distinctive wares, could be deemed worthy of keeping. She considered a type series as the most informative way of publishing the pottery. She opted for a process where all diagnostic shards were registered and tied to a type series. If a new type appeared during the registration, a new type was added. She considered it good to publish a drawing (and short description) of all shards that were "suitable" for drawing, while the rest could be just recorded according to the type series. After recording, they could be discarded. She considered drawing many items important because visual impression is helpful for the identification of shards to be sorted. First, after sorting the material she considered it possible to assess if the features used for identifying types were significant or not. Significance was related to chronological differences between the identified types. She considered rim shapes to be the most likely part of vessels to bear such chronological information (Kenyon 1961: 152–153; 1971: 273–277). Such detailed work required large resources, and the final reports of the pottery from the Jericho excavations in 1952–1958 only appeared in 1982 and 1983, after Kenyon's death in 1978 (Kenyon & Holland 1982; 1983).

The retrieval of pottery in the Shechem excavations in the 1960's (Cole 1984: 3; Davis: 2004: 106–108) is in line with the principles that Aharoni used at Tel Beer Sheba in 1969–1971. All the pottery was washed and sorted, and after this the restorable pottery was kept and restored. From the fragments, a selection was kept while most of the shards were discarded (Aharoni et al. 1973: 120). Ilan describes the selective retrieval at Tel Dan, with the differential strategies for 1) loci with possible restoration that were curated nearly completely, and 2) for the surface loci that were usually culled for indicative fragments and thus resulted in a smaller proportion of curated material. In this case, it turned out that there was also restorable material in the surface material, mixed with material from stratum IVB (Ilan 1999: 68). The description of the field work and the retrieval of finds at Tel Kinrot is included in chapter 4.

Interpretation of Early Iron Age settlements

Over the history of research in the region, the nature of the Early Iron Age was for a long time interpreted according to the biblical narratives, as a time of semi-nomadic people and villagers. Settlement was interpreted as focusing on villages. This was seen in stark contrast with the settlement pattern of the "Canaanite" Late Bronze Age, with settlement concentrating in large city states (1500–1200 BCE). These flourishing urban centres collapsed, marking the end of the Late Bronze and the beginning of the Iron Age. The beginning of the Iron Age was seen as marked by newly founded, small villages, and the urban centres had shrunk as well to villages (Mazar 1992: 334–336; Stager 1985, 3–4). This abrupt change in the settlement pattern was interpreted as a result of the Israelites conquering the land of Canaan, destroying the cities and building up their tribal villages (e.g. Albright 1960: 112–113; Yadin 1972: 129–132; Stager 1985: 9 and A. Mazar 1992). Such an interpretative paradigm can be traced to biblical scholarship and to the work of Albrecht Alt (1883–1956), who based his theory of the Israelites as a semi-nomadic people on textual research (Alt 1929). This interpretation was adopted by several scholars working in Israel, like Yohanan Aharoni and his students, including Aharon Kempinski and Volkmar Fritz (Knauf 1998; see also Herzog 2003). Since then, the urban nature of the Late Bronze Age II period has been challenged (Herzog 2003: 85–92). There was a considerable time in the research from the 1980's on when the published settlements of the Early Iron Age were rural (e.g. Mazar 1981). Since the turn of the millennium, publications from Tel Kinrot (e.g. Fritz 2000; Fritz & Münger 2002), Tel Rehov (e.g. Mazar 1999; Mazar et al. 2005), and Tel Yin'am (Liebowitz 2003: 17) have started to add urban sites on the map.

The picture of early Iron Age life in Israel-Palestine as semi-nomadic village-life was the framework for interpreting the urban settlement of Tel Kinrot during the Early Iron Age as exceptional (Fritz 2000: 507–509; Münger et al. 2006: 63). Fritz stressed the exceptional nature of Tel Kinrot's urbanization "long after the final destruction of most of the former Canaanite cities […] and more than a century before the re-urbanization of Iron Age II which started in the 10th century BCE with the establishment of the united monarchy under David and Solomon (Fritz 2000: 508–509)." Now it seems that the re-urbanization, after a decline in settlement size at the end of the Late Bronze Age, began already during the Early Iron Age at several sites in region, or was absent from some sites. Tel Kinrot is not so much of an exception, but a natural part of the settlement pattern consisting of cities interacting with villages around them and fluctuating in their size. It is one of the early vital urban sites in the beginning of the Iron Age. Other major urban sites in the northern inland region of Israel-Palestine include Megiddo and Beth Shean, which were small compared with Tel Kinrot during the Early Iron Age. The Early Iron Age from Tel Dan has been too poorly published to evaluate the size and urban character of the site. However, it seems that Dan was sizable and probably an urban settlement (Ilan 1999). It seems that Tel Rehov (e.g. Mazar 1999) and probably Abel Beth Maacah (Wachtel et al. 2013; Panitz-Cohen et al. 2013) are also urban settlements from the Early Iron Age. On the coast, urban sites dating to the Early Iron Age include Dor, Tell Qasile, and Tell Keisan.

The origins of the Early Iron Age population was a theme for vigorous discussion in the 1990's (e.g. Ben-Tor & Ben-Ami 1998; Finkelstein 1998, 1996; Mazar 1997a). The connection between ethnicity and archaeological evidence is a complex and disputed issue (Meyers 1993: 738–745; Kletter 2006). It has been suggested that the inhabitants of Early Iron Age Tel Kinrot may be related to or rooted in the region north of Tel Kinrot, now part of southern Lebanon and Syria. The suggestion is based on based on pottery ("Syrian amphora", see 5.2), and glyptic representations of the Syro-Egyptian Deity Reshef (Münger 2005: 86–87; 2008: 96; 2009: 130, footnote 79; 2011: 234–235; Münger et al. 2006: 64). These questions about ethnicity, as well as the absolute chronology of the Iron Age in Israel-Palestine, fall outside the focus of my study.

2.3 Pottery Typology – Principles and Practice

The Typological Approach

Artefacts and their study was at the core of antiquarianism even before archaeology as a scientific study was formed (Trigger 1989: 61–71). The birth of archaeological science is connected with the development of the typological method in the 19th century in Denmark, by Christian Thomsen (1788-1865), Jens Worsaae (1821–1881), and Sophus Müller (1846–1934), and in Sweden by Oscar Montelius (1843–1921). The background of the typological approach is connected with biology, both through the taxonomic work with plants by Carl von Linné (1707–1778) in Sweden and through the theory of evolution by Charles Darwin (1809–1882) in Britain (Trigger 1989: 76–86). The resultant taxonomies aimed to define a hierarchical system, wherein one specific attribute is considered definitive for each level of taxonomy, from primary traits to secondary and so on (Krieger 1944: 273). Artefact typologies have mostly served three aims: communication, chronology building, and the definition of cultural groups, the latter two of which are at the core of culture-historical archaeology (Krieger 1944: 271–273). The typological method has its roots in the culture-historical tradition. Series of regional chronologies were built by examining material from closed find associations to determine what kind of artifacts occurred together. Cultures were (are) defined on the basis of diagnostic artifacts, specific for a region and a limited time (Trigger 1989: 156–157, 170). Pottery was (and is) important because its stylistic[2] attributes are sensitive indicators of change. The culture-historical approach has continued to be influential, and serves significant needs especially in the context of evolving group identities (Trigger 1989: 202–205, 244). This holds also for Israeli archaeology, especially in its early phases (Kletter 2005: 319–320).

For Montelius, typology was the study of evolutionary development in pursuit of chronology – therefore the differences within a group of objects of the same function were the focus (Klejn 1982: 39–44). For Krieger, the type was a unit of cultural practice identifying distinct patterns of behaviour or technology which could be acquired by one human being from another. Thus a type could serve as a tool for tracing cultural development and interactions (Krieger 1944: 271–272). It was assumed that there was a certain ideal pattern, shared by the members of a culture, and the variability within the material of one cultural group was the result of differing abilities in reaching this ideal. This variation was thus seen to be of little historical significance. The task of the one studying the objects would then be recovering the ideal mental patterns lying behind them. According to Krieger, the purpose of a type *must* be to provide a tool to enable grouping the objects into bodies which have "*demonstrable historical meaning in terms of behaviour patterns.*" In particular, the divisions between the types in a series should be based upon historical factors. For this reason it was essential that the type has a limited distribution in space, time, and association with other cultural material (Krieger 1944: 272–278, Spaulding 1960: 66, 75–76). Changes in the material culture appeared as responses to changes in the environment.

[2] The concept of style is used in manifold ways in archaeology and anthropology, see e.g. Rice 1987: 244–272, Conkey & Hastorf 1990 and David & Kramer 2001: 168–224.

There has been wide discussion on the nature of types as constructed or "real" entities – in this discussion "realism" indicates a correspondence between the modern classifications and the ancient ones. The constructed nature of types was already being discussed in the 1940´s (e.g. Krieger 1944, Brainerd 1951, for a summary see Klejn 1982: 80–90 and Rice 1987: 283–284). Type definitions often force boundaries on material that are not simply observed entities, but are rather to a large extent arbitrary. Types are prescribed by the pre-understandings of the researcher and the tradition he/she is working in. On the other hand, the work is also often data-led and sensitive to the distinctive nature of certain materials. The pre-understandings and data-led nature of archaeological reasoning are discussed by Hodder in general (1999: 49–51), and by Adams & Adams (1991: 50–73) and Rice (1987: 283–288) for typological work specially. The typologies, like archaeological research in general, are both constructed and observed, both subjective and objective (Hodder 1999: 52; Adams & Adams 1991: 67–68; 182–183). A typology is a scholarly construction, and should not be regarded as a *re*-construction of the ancient potter's or consumer's categories. However, the pottery presentations commonly use functional terminology associated with consumption patterns that were most likely relevant for the ancient people (e.g. cooking pots, lamps, storage jars).

It is also noteworthy that we can assume that the ancient people must have had classifications as well, and there are many studies on folk classifications in ethnographic research. Folk classifications are essentially functional and largely fluid (Rice 1987: 278–281; David & Kramer 2001: 158–160). However, it has been attested in several ethnographic studies in traditional potting communities that standardization is a deliberate outcome expected by the consumers, and producers that are able to create very similar vessels are regarded as skillful (Longacre 1999: 53; Mills 1999: 109). Despite a certain level of standardization that results in a homogeneity of pottery-shapes and surface treatments, there is regional diversity between various production centers. Many details, e.g. in clays, vessel repertoire, and decoration, could be assigned to a certain village, or in some instances even to a single potter (London 1989b: 226). There is also an inevitable variation in all hand-made pottery, especially in the details of rim forms (Miller 1982: 42). Two factors are especially crucial to *systematic* changes in locally produced pottery: the chronology and locality, both related to the production community and its clientele (London 1989b: 227–228).

Interpretation is needed when an object or its features are defined. These definitions are imposed on objects as they are described and sorted. Decisions need to be made between types and their boundaries, and recording the existence of a certain feature, such as when an object is described as "burned" after a certain amount of trace burning is discerned, or when a shard is defined as "worn" when there is enough observed use-wear. Whether or not characterizations like "burned" or "worn" are used is an interpretative decision (Hodder 1999: 84–85). In practice, new types can be created if an object does not fit into any existing type - but this requires a decision on the level of difference that needs to be exceeded in order to create a new type. As a practical working tool, the typology is often extended during the sorting work.

As a consequence, the types that exist at the beginning of the process are not exactly the same as those that exist when all of the material has been sorted.

A type consists of objects with some similarity to each other, our ideas about these objects, and the expression of these ideas (Adams & Adams 1991: 29; Leach 1976: 17–22). Typology is a particular kind of classification: one designed for categorizing and labeling things, and segregating these things into groups that are mutually exclusive. Its function is to bring order into a mass of observations. Typology is designed for sorting entities in a situation where every entity has to be sorted. This means that a typology needs to be comprehensive. A practical necessity for the sorting process is that the groups have sharp boundaries between themselves. The mental process in sorting is that of segregation or partitioning (Adams & Adams 1991: 47). Sorting, labeling items, and creating their related descriptions include actions of judgement and interpretation. However, the common practice of separating the description from interpretation is artificial (Hodder 1999: 67–69). This separation allows the methodology to be described as a linear process of retrieval-recording-analysis-interpretation (Renfrew & Bahn 2000: 111–114; Sharer & Ashmore 1987: 104–109). This hides the recursive nature of the archaeological work (Hodder 1999: 99).

2.4 Pottery Studies in Israel-Palestine

Pottery studies have had a central role in the archaeology of Israel-Palestine. The typological approach has had a dominant position in these pottery studies, due to the large amount of finds and the impact of scholars like Sir Flinders Petrie (Duncan 1930; Davis 2004: 29), William F. Albright (Davis 2004: 74), and Kathleen Kenyon (Kenyon 1961), to name only some of the most prominent archaeologists in the research history of Israel-Palestine. Petrie pioneered by creating a pottery sequence for cemetery material in Egypt (Petrie 1901; Davis 2004: 28), as well as for the stratigraphically excavated Bronze Age settlement of Tell el-Hesi in Southern Israel-Palestine (Petrie 1981, 1904). Petrie published pottery by (idealized) types rather than individual items, as he considered only the occurrence of a type important, not the amount of items (Petrie 1931–34; Davis 2004: 29–30, 73). Such 'type pots' were also used in the corpus of Palestinian pottery by Duncan (1930), and in the early reports of Megiddo (Loud 1948) and Beth-Shean (Fitzgerald 1930): one line-drawing was used to illustrate several vessels that were considered similar. Such a sketchy description of pottery was considered inappropriate by Albright (1938: 338–339). Albright illustrated real vessels in the publications, and also discussed fragmentary material (e.g. 1932, 1938). Albright aimed at the dating of pottery types "within a quarter of a century" (Wright 1940: 401). Kenyon was well aware that the pottery could not be directly dated, but if the typological sequence could be dated with the help of stratigraphy, then similar forms of vessels would be contemporary and an appearance of a new type could be used as a chronological marker. Later on, the typological sequence could then be tied to historical events known from texts, such as biblical and other Ancient Near Eastern materials (Kenyon 1979: 15–16).

In reports before the 1960's, pottery types were not defined explicitly, but the comparisons between the sites formed implicit types. The descriptions of pottery in the early reports rely partly on general features and partly on single items (e.g. reports from Hazor edited by Yadin 1958; 1960 and Gezer II ed. by Dever et al. 1974). The explicit typologies increase in number from the 1980's on, parallel with the spread of attitudes derived from processual archaeology, such as the use of scientific methods and the testing of models. This is also the time period when personal computers became available. Typological presentation quickly became the norm, as can be illustrated by the reports from Jericho (Kenyon 1982), Beer-Sheba II (Brandfon 1984), Schemchem (Cole 1984), Tel Qasile (Mazar 1985), ʿIzbet Sartah (Finkelstein 1986), and Beth Shean (Yadin & Geva 1986). All of these reports present the pottery arranged as a typology. By *typology* I mean a classification that is made for categorizing a specific set of entities (like pottery vessels from a site) into categories that are mutually exclusive (Adams & Adams 1991: 47). The move from implicit groupings to explicit typologies did not take place without hybrids of the two appearing, such as the presentation of the pottery from Tell Keisan, which includes both explicit types and single-item descriptions (Puech 1980: 216–230), or the pottery chapters from Megiddo III (ed. by Finkelstein et. al 2000).

Explicitly defined types have become common at the same time as keeping strategies have generated larger quantities of pottery shards than ever before. Including drawings of all fragmentary material has not become common in archaeological reports. The reasons may be manifold, and related to publishers, editors, and the intended audience alike. Including more illustrations, especially photographs, adds to the costs of the publication, and may also slow down the publication process (Joukowsky 1980: 458). It has become common practice that some examples of defined types have been drawn, while the rest of the shards have been "recorded as of a particular form in a type series" (Kenyon 1961: 153). In Kenyon's case, the examples drawn from Jericho (excavated in 1952–58) present an extensive amount of mainly fragmentary material (Kenyon & Holland 1982). It is no wonder that it took over 20 years to publish the material.

The aim of pottery studies has largely been chronological, and therefore the measure of success for the typologies needs to be evaluated from chronological perspective as well: how well do they serve the dating process? Albright excavated Tell el-Ful in 1922 and 1933 (Albright 1922: 9–10; 1933: 6–12). He focused on ceramic analyses in order to reconstruct the site's history. In 1964 Paul Lapp directed a salvage excavation at the site, and Albright's description was still considered valid thirty years later (Lapp 1969: 69; Davis 2004: 67). The typological ceramic study still plays a prominent role in the chronological discussion. The similarities between the ceramics from different sites are still central to the discussion of the Iron Age, and to the chronology of Israel-Palestine (e.g. Mazar 2005). The possible connections between the excavated sites with biblical (hi)stories of early "Israelites" (Albright 1960: 110–126; Yadin 1972: 129–132) or kings of Israel and Judah had probably made the aim of such an accurate pottery dating system very appealing to archaeologists, biblical scholars, and the wider audience alike (Mazar 2005: 17, 19).

A work of major impact on pottery presentations in Israel is the classification system presented by Ruth Amiran in 1969. The book is a general introduction to the pottery from Israel-Palestine from the Neolithic to the end of the Iron Age. Thus the presentation is not detailed, but aims at an overview. Most other typological presentations of pottery are parts of different excavation reports. Many of these typologies refer to the work of Amiran explicitly, like those of Yoqneᶜam (Zarzcecki-Peleg et al. 2005) and Tel Qiri (Hunt 1987). The pottery typologies are taxonomic, arranged in hierarchies of two or more levels. They are foremost morphological, but also take into account in varying degrees the ware, surface treatment, and decoration. The upper hierarchy is a division into classes that usually have a common postulated function. In the next level the classes are further divided into morphologically distinct types, and these are often divided into sub-types. In other regions as well, archaeological typologies are hierarchic and stress morphology (Sorensen 2015: 89).

2.5 Pottery Typologies as a Kind of Literature

In this section I will discuss the presentation of pottery in archaeological literature in general, while I will describe the Tel Kinrot pottery typology in particular in chapter 5. However, I started my work with the particular: the Tel Kinrot pottery descriptions. Later on, I edited my descriptions after having read a host of pottery reports. I preferred this order because in the beginning I wanted not to be too much guided by typologies made for materials from other sites. After making the classifications, and while writing the descriptions, I made intensive use of other typologies. I became interested in typologies as a certain kind of text during the process of making one by myself. I would have liked to know how the other people made their typologies, but the published typologies were surprisingly silent about that. In order to look *behind* the presented typological schemes, I examined them as they would appear if read as literature. This style of working order provided me with an opportunity to look at my own work from distance. It was revealing, while also embarrassing at points: I was also silent about many decisions I had made about type borders; I also focused on ideals, and not on the variation within the defined types. My work is focused on pottery from the Iron Age from Tel Kinrot, but many principles should be applicable to ceramics from other periods, or to other materials. However, my insights might be different had I worked with ceramics from the Early Bronze Age Palestine, or worked with lithics from Fennoscandia.

For many readers, archaeological artifact typologies may appear as naturally organized groups of items, or innocent presentations of archaeological materials. This is not the case. Typologies are written texts that appear in archaeological literature. They are a special kind of literature, made by particular people for certain purposes, appearing in specific contexts for a given audience (other archaeologists) to use for some restricted purposes. All of the above mentioned issues affect the interpretation of a text. Therefore, I consider it essential to have a closer look at *what kind of literature the typologies actually are* in the context of the archaeology of Israel-Palestine. In the following section I will discuss the pottery typologies as a group of literature, sharing some characteristics. Before analyzing the typological pottery presentations, such key concepts as text, genre, style, and text-type require definition.

2.5.1 Themes, Concepts and Stylistic Features of Analysis

I use a narrow meaning of the word **text**: it means words printed on the pages of journals or books. Thus, a picture is not a text, but pictures are elements that may be and often are combined with text in the composition of pottery presentations. I treat pottery typologies as a group of compositions that somehow resemble each other and can be treated as a sub-genre of a broader spectrum of scholarly reports. I consider pottery typologies as a sub-genre in order to highlight their relatively distinctive features, which set them apart from many other types of reports, although at the same time they may share many features with them as well. I use the term genre for classifications relying on the idea of family resemblance (Wittgenstein 1953: PU § 66; Newsom 2010: 272–273). At the same time, I think that the term genre implies other relevant aspects: the social function of these writings, both as a means of making sense of the mass of archaeological materials (conceptualizing the world), as well as a means of communication between archaeologists (transmission of archaeological know-how). These reports have a specific context and use in the research community. Pottery presentations also count as publications, and thus as an academic achievement for their writers, while publishing excavations is also regarded as the duty of all excavators (e.g. Joukowsky 1980: 457). Archaeological reports in general have been considered a genre of their own (Marciniak 2003).

Genre is a concept that has been used intensively and in varied ways, especially in the study of art, literature, and linguistics, and since the 1980's increasingly also within fields like ethnography and sociology (Freedman & Medway 2005; Heikkinen & Voutilainen 2012). Genre as a term originates from the Greek genos (*γένος*) meaning race, stock, kind, or offspring (Liddel & Scott 1968). Its use in categorization was started already by Aristotle in the 4th century BCE (Poetics), as normative descriptions for literature divided into poetry, drama, and prose (Juntunen 2012: 529). In everyday use, genre is also mostly connected to the arts. The Merriam Webster encyclopedia gives the following definition: "a category of artistic, musical, or literary composition characterized by a particular style, form, or content." Synonyms in dictionaries for genre include terms like *class*, *manner*, *style, kind,* and *type* (Random House 2015; American Heritage Dictionary 2011; Merriam-Webster 2015).

I understand genre as a relatively stable way(s) of expression related to certain themes, compositions, and contexts (Bakhtin 1986 [1953]: 64; Heikkinen & Voutilainen 2012: 21). As a specific way of acting and communicating in certain contexts, genre informs the recipient and guides the interpretations of a message. Genre is closely related to the values, ideologies, and identities of the community that shares it (Heikkinen & Voutilainen 2012: 17). Genre can be a product as well as a process (Heikkinen 2012: 66). The concept of genre is broader than the concept of *style*: genre includes the themes expressed, the stylistic conventions, and the contexts and the social uses of the material (Heikkinen & Voutilainen 2012: 17–21). Style includes form of presentation, syntax, and vocabulary typical for specified situations and it is related to the aim of the text as well as to its social context (Selting 1999; Voutilainen 2012: 77–83). The pottery presentations include both text and illustrations. In the following analysis, I will focus on features I have observed from the pottery typologies, including text and figures.

Texts have also been divided into different **text types**. According to Egon Werlich, texts can be divided into five basic types according to their prevalent emphasis on 1) descriptive, 2) narrative, 3) expository (i.e. analytic or explanatory), 4) argumentative, and 5) instructive texts (Wehrlich 1979: 28–41; Lauerma 2012: 67). As with any typology, one for texts also has limitations that derive from the method of analysis. The categorization into five basic types, and the rigidity of such presentation, has also been criticized (Fludernick 2000: 276–277; Lauerma 2012: 68–69). The concept of text type is narrower than the concept of genre. The text type focuses on the text itself as a linguistic unity, defined by some characteristics. The concepts of text type and style are very close to each other: their meanings overlap, and the words are even used as synonyms (Voutilainen 2012: 86–87). There is a difference in the nuances though: text type can be considered as a classification based on stylistic analysis. Style is a broader concept that is not limited to the study of texts, and does not necessarily aim at classification. I will use the concept of style instead of using the concept of text type. With this I will try to avoid confusion between the types of pottery that are analyzed later on and the conceptual tools I am using while analyzing the pottery typologies as texts.

The context of the pottery presentations highly affects their interpretation. Most commonly (if not always), the pottery typologies appear as separate chapters after architectural and stratigraphical studies, or as a separate volume in a series of excavation reports on a site. Pottery descriptions in the excavation reports are not necessarily always arranged as typologies – at least not as explicit typologies. Many of the excavation reports that appeared before the 1980's in Israel-Palestine discuss pottery within the stratigraphic presentation, such as the Gezer volumes I, II, and IV. In Gezer I, the pottery descriptions are brief and embedded in the stratigraphic descriptions of the loci within which the vessels were found (Dever et al. 1970). In the Gezer II and IV reports, the pottery descriptions appear in smaller sections separated by a heading 'Pottery' or 'Pottery and Objects' separately for each stratum of each excavation area. These sections describe the pottery in terms of types, though the types do not have explicit definitions (ed. by Dever 1974; Dever 1986). In the reports of Gezer III and V, the authors adopted a typological presentation (Gitin 1990; Dever 1988; Seger 1988).

Pottery sections of excavation reports tend to be extensive pieces of writing, including a fair amount of illustrations. In an article that discusses the Iron Age pottery from Tel Dor at length, Gilboa (2003: 11–13) expressed that "a full exposition [of pottery is] possible only in the framework of a final excavation report." Exceptions to this general picture appear in the case of small-scale excavations where only a small amount of well-preserved material has been retrieved (e.g. Zimhoni 1985). Most articles that describe pottery focus on specific vessels (e.g. Faßbeck 2008) or selected groups and their interpretations, be they chronological (e.g. Gilboa 2003; 2004; Singer-Avitz 2014), functional (Gadot et al. 2014), or cultural/ethnic relations (e.g. Münger 2013; Fischer & Bürge 2013). The articles may discuss material from restricted contexts only (e.g. Zimhoni 1990; 1997), or present preliminary excavation results, where pottery serves as chronological indicators and illustrations (e.g. Zimhoni 1992; Mazar 1999; Sugimoto 1999; Fritz & Münger 2002).

Monographs other than excavation reports that focus on pottery and present it in typological format tend to be limited to some specific style, like those connected to the Mycenaean (Furumark 1941; Desborough 1964), Philistine (Dothan 1982; Yasur-Landau 2010), or Cypro-Phoenician cultures (Schreiber 2003), or a specific vessel class from several sites and from a restricted time sequence, like chalices (Grutz 2007) or pyxides (Wicke 2008). Some edited volumes focusing on pottery have some common theme and/or restricted period of interest, like the Early Bronze Age (ed. by Philip & Baird 2000), or the Ottoman Levant (ed. by Walker 2009). In addition, there are few presentations of ceramics from several periods aiming at an overview, such as those for Israel (Amiran 1969) or Jordan (Dornemann 1983).

Theme denotes a subject matter of the composition. In pottery reports, the inherent part is the description of the archaeological pottery, while there are other common themes as well, related to the pottery. These other common themes are relatively varied. Most of these are included in the introduction, or the discussion after the type descriptions. Themes in the introduction often include a methodological discussion, a note on quantification, and a description of the contexts from which the pottery derives. The discussion at the end of the typology includes both chronological and cultural implications drawn from the material, as well as other, varying aspects such as the functional analysis of the space use at the site or the mode of production of the pottery.

By **structure** I mean here rather technically the way of organizing the text, such as the length of sentences and paragraphs, the use of headings, and the relation of the text and figures (drawings or photographs of vessels and graphs or tables included). Pottery reports, as most scientific texts, include references to figures or literature – features that set them apart from many other text genres like popular books or news. Excavation reports tend to include many lists, from the table of contents and list of figures at the beginning to the lists of loci and bibliography at the end. In addition, pottery reports often include lists of occurrences of pottery vessels at the site, and reported or cited parallels from other sites.

However, there is another meaning for structure as well: on a somewhat more abstract level, typologies have a structure, i.e. the way the material included in the typology has been organized. Structures of typologies are usually hierarchical. If the relations were drawn, they would form tree diagrams (for a tree diagram of Tel Kinrot pottery types, see Appendix 2B). In such an arrangement, the scholar has to decide the order of features according to which the hierarchy is built. Such a hierarchical system can be criticized for its rigidity and inflexibility. The hierarchy that is constantly followed in order to reach clarity and consistency may at the same time obscure connections of features that appear at the end of the observed features hierarchy. Typologies have been criticized as being too rigid in their hierarchic order of accounted features and giving the 'types' an ahistorical and natural status (Pfälzner 1995: 10; Langin-Hooper 2011: 41–52; 2013: 460–461). Langin-Hooper deemed typologies as generally un-reflexive of the categorizing process. This may have been the case for the Hellenistic figurine studies she was discussing. However, many recent pottery reports from Israel include a section where the construction of the typology is actively, though usually briefly, discussed. On the other hand, there are also presentations where such discussion is absent (see below).

Style: Descriptive texts typically use plenty of adjectives, and the verbs that indicate observations. Narrative texts tend to use active verbs and express dynamic action. Expository texts have been defined by static expressions, or verbs indicating being or having. Argumentative texts usually explain phenomena and use verbs indicating causality and expressions, indicating relationships such as similarities and differences (Werlich 1979: 40). The text style of pottery reports in general can be characterized as descriptive, but also analytic, as the descriptions often aim at precise definitions and generalizations. The descriptions can further be considered rather technical. Argumentative elements may occur, especially in certain parts of the composition. Style as a spoken communication is produced communally (Selting 1994), so that the speaker accommodates his/her speech according to the recipient (Voutilainen 2012: 84). A similar alignment to a shared set of expressions and use of language should appear in written communication. In order to be accepted by the audience, the text (e.g. a pottery representation) has to relate to other texts of the genre, for example use the same concepts for the same forms.

The agency in any texts can be explicit or hidden. Use of passive vs. active language can be revealing. The passive language hides the agency of the scholar(s). In addition to using passive proper, using the first plural "we" also can leave the identity of the agent to some extent open. The actor in the active language can be the typologist, or at the textual level the ancient potter, or the vessels may even be the active agent. The passive mode hides agency, and therefore the actor behind a statement (and responsible for it) remains obscure. Using the passive voice, as well as moving from active verbs to noun-phrases, may make the statements more timeless and total, independent of the observer and therefore 'more real.' It seems that stating "I divided the bowls into three types" makes the specified bowl types less objective than writing "bowls can be divided into three types." Academic writers tend to favor the passive voice and a distance between the author and the subject matter, especially in the parts that cover the methods used and the results of their study (Billig 2013: 129). Favoring nouns instead of verbs may serve the aim of being objective and distanced. In English academic writing, the amount of nouns used in proportion to adjectives and verbs is much higher than in fiction or in spoken language (Billig 2013: 81; Biber, Conrad & Reppen 1998).

The vocabulary used can be fixed or varying, ambiguous or clear and explicit, superfluous or precise. In general, one can characterize archaeological reports as distanced and descriptive. There is a general aim of giving 'pure descriptions' and avoiding speculative interpretations (Joukowsky 1980: 462–464) – a principle that follows from the same distinction between observation, recording, and interpretation in general (Barker 1993: 159–162; Renfrew & Bahn 1991: 95–98). Pottery reports include a fair amount of fixed and special terminology related to vessel forms (e.g. 'lug' or 'knob' handles, 'carinated' forms of bowls or kraters), surface treatment (slip, self-slip, wheel-burnish) or decoration patterns (metopes, concentric circles, ‘line’ for thin painted line and ‘band’ for a broader painted line). Some vessel names (krater, pyxis, amphora) derive from Greek. These terms are not translated, nor are they usually explained. Terms like ‘goblet’ and ‘chalice’ indicate specific forms of stemmed cup or bowl. It is noteworthy that a fixed term does not necessarily mean that the meaning of the term is fixed as well. This is clear in the case of a jar type labelled ‘collar-rimmed’ pithoi/jars, where the ‘collar’ has been understood in two different ways: 1) indicating a ridge at the bottom of the neck (Mazar 1981: 27; Finkelstein 1988: 276; Killebrew 2001: 377; Herr 2007: 138), but also referring 2) to the thick, folded rim (Callaway 1969: 8–9; Ilan 1999: 81).

2.5.2 Analysis of Selected Pottery Reports in Israel-Palestine

Selection of material: In the following analysis, I focus on reports presenting material dated to periods close to the material from Tel Kinrot. This means that the majority of the reports I discuss present material from the Iron Age, though I have included some presentations of Late and Middle Bronze Age material, as well as one Iron Age II pottery typology, in order to widen the perspective. The analysis does not aim to be exhaustive, but to reach a fair picture of the state-of-the-art at the beginning of the 21st century in terms of pottery presentations in Israel-Palestine. Therefore, recently published reports are in focus. I wanted to select reports from sites that have been considered especially important, such as Hazor and Megiddo. I also wanted to include reports that have varying authors from different universities and institutions as well as different publishers, in order to be able to discern trends that are common in Israel in general. The writers are all Israeli archaeologists, who naturally form the majority of archaeologists within the country. The few recent excavation reports of sites in Israel or Jordan published by American (Liebowitz 2003, final report of Yinʿam) or European (Fischer 2013, final report of Tell Abu al-Kharaz) institutions and authors I was able to find do not differ substantially from those by Israeli authors. The two reports mentioned above lack a detailed methodological discussion about the typology building: Liebowitz includes a fairly short description of it (2003: 106–107), while Fischer only mentions that the criteria of classifying vessels are subjective (2013: 389, footnotes 70 and 72). The relatively few reports that I analyzed in detail include variability as well as coherence. Of the reports I chose to read closely, I selected to observe their structure; the content of the introductory part; the agency; the length; detail and formulation of type descriptions; the style, use of illustrations (drawings, photographs, and tables); and the themes included in the concluding discussion.

I chose the reports of Timnah II (Mazar & Panitz-Cohen 2001) and Timnah III (Panitz-Cohen 2006) because both include highly concise discussions on methodology and descriptions of the process of pottery study (recording and typology building). This very same reason may, however, mean that they are not typical reports in this respect. I included the report of Tell Qasile (Mazar 1985), although not so recent, because it has served as a guideline for several other reports, as explicitly mentioned in Timnah reports (Mazar & Panitz-Cohen 2001; Panitz-Cohen 2006) and Megiddo IV (Arie 2006), and can be described as a pioneering work for typological pottery presentations (Mazar 1985: 1). Because of its pioneering character in establishing a type series for pottery in Israeli archaeology, it explains the material retrieval, the work process, and the method of typological analysis in relative detail.

I included the series of reports from Megiddo (III, IV, and V, by several authors) in the analysis because Megiddo is often considered to be a key site. With three reports published there is potential to see a development and variety of presentations within one site. The series of reports from the renewed excavations at Tel Beth-Shean would have been a good alternative as well. However, I chose the series of Megiddo because this alternative gave more variation in terms of authors. The reports from Tel Beth-Shean were to a large extent written by the same authors as the Qasile and Timnah reports (Amihai Mazar and Nava Panitz-Cohen). In addition, the report series from Megiddo covers a longer period in time of publishing (from 2000 to 2013) than the publishing sequence of Tel Beth-Shean (2006–2009), and therefore I expected more variation.

The recent Hazor VI (Ben-Ami & Ben-Tor 2012) excavation report is written by different authors and produced by a different publisher than those indicated above. In addition, Hazor is generally considered an important site, and the early reports by Yadin have served as a reference for countless pottery presentations, including the report of Kinneret I (ed. by Fritz 1990). Hazor is also situated close to Tel Kinrot, and therefore is also of interest for the Tel Kinrot typology in section 5.2. The report from Ḥorbat Rosh Zayit, an Iron Age II fort and village, was included as a report illustrating Israel Antiquities Authority (IAA) publication practice. This is the only report that did not include Early Iron Age material in its typology, except for a few types that continue into Iron Age II, like cooking pots with a triangular rim and lamps (Gal & Alexandre 2000: 40–42, 67). Thus, I ended up with eight excavation reports from five different sites, including altogether 13 pottery reports. The amount is not massive, and the selection obviously does not fulfill the requirement of being statistically representative for the population of pottery reports, even from the restricted area of Israel-Palestine. However, the fact that they derive from different projects and were written by different authors brings in enough variation to enable one to define trends that are shared by most recent reports. At some interesting points I have also included other reports than those included in the analysis throughout.

Context: all of the studied pottery reports have been published as parts of an excavation report, or as a volume in a series of excavation reports. Thus, they are part of a larger, edited work with usually several authors and one to three editors in charge. Even unpublished Ph.D. pottery typologies (Gilboa 2001, Ilan 1999) have been related to ongoing excavation publication projects. In all cases, the pottery is presented after the architecture and stratigraphy, and this seems to be the norm in general for the reports that present the pottery as a separate section. In most reports, the "other finds" have been placed after the pottery, either separately for each stratum, like at Ḥorbat Rosh Zayit (Gal & Alexandre 2000), or as a separate section, dealing with various finds from several strata, like in reports of Hazor VI (edited by Ben-Tor, Ben-Ami & Sandhaus 2012), Megiddo III, IV, and V (edited by Finkelstein, Ussishkin &

Halpern 2000, 2006; Finkelstein, Ussishkin & Cline 2013), and Timnah II and III (edited by Mazar & Panitz-Cohen 2001; Panitz-Cohen & Mazar 2006). Only in the report of Qasile were the various finds of differing materials placed before the pottery (Mazar 1985). Most excavation reports close with conclusions relating to chronological and historical themes: this is the case in the reports of Qasile (Mazar 1985), Timnah II & III (Mazar & Panitz-Cohen 2001; Panitz-Cohen 2006), Megiddo III, IV, and V (edited by Finkelstein et al. 2000, 2006; 2013), and Ḥorbat Rosh Zayit (Gal & Alexandre 2000) – only in the Hazor VI report (ed. by Ben-Tor et al 2013) is such a concluding chapter absent. The pottery presentation always takes up a major part of the finds section, and actually covers a considerable part of the whole report, especially if the illustrations are regarded as a part of the pottery chapter. It is noteworthy that the pottery plays a major role in the dating of the strata at the sites. Therefore, the chronological emphasis of pottery typologies is natural.

The **Structure** of the pottery presentations is rather clear cut: they all have some kind of introductory part, either as a section at the beginning of the pottery presentation or as a separate chapter before the typology. Introductions are the most varying part, both as to their length and contents (see below).

A description of types follows the introductory part. The types usually have codes and labels, and are commonly arranged by larger groups and sub-divided, at least in some cases, into subtypes. The groups and types also serve as headings in the text. They form hierarchic taxonomies of at least two levels, often of three, and sometimes even of four levels. The upper hierarchy is a division into classes that usually have a common postulated function, sometimes explicitly expressed in the label ("lamp", "cooking pot", "storage jar"), but sometimes only the use of a modern category implies some rather undefined function ("bowl", "jug"). The divisions into types are to a large extent morphological, but also take into account, in varying degrees, the ware, surface treatment, and decoration. The pottery is presented in a rather fixed order from open vessels (bowls, chalices, kraters, and cooking pots) to closed vessels (storage jars, pithoi, jugs, and other small containers). Specific wares or decoration styles are treated separately. Such an order was also adopted by Ruth Amiran in her general introductory book "Ancient Pottery of the Holy Land" (1969), which is often referred to in pottery reports, such as Megiddo IV, chapter 13 (Arie 2006), Ḥorbat Rosh Zayit (Gal & Alexandre 2000: 27), Yoqneᶜam II (Zarzcecki-Peleg et al. 2005), and Tel Qiri (Hunt 1987). Amiran's book covers the periods from the Neolithic to the end of the Iron Age II and aims at an overview.

In addition to the morphological types that are considered of local production, there are some distinctive wares that are defined according to ware, surface treatment, and decoration. These classes have been considered as distinctive in their appearance and cultural or chronological distribution, and they have a commonly accepted connection to a cultural (or ethnic) group. These wares, such as Phoenician bichrome, Black-on-Red, or Philistine wares, can include functionally different forms as types and sub-types (Amiran 1969: 266–275; Dothan 1982: 94–96; Yasur-Landau 2010: 194–196). These wares are often treated separately in the pottery reports, especially if they are imported items. Vessels that have been interpreted as local imitations of these specific wares are often described in conjunction with the imported wares, as in the reports of Qasile (Mazar 1985: 82–103), Megiddo V (Martin 2013: 395–396; Yasur-Landau 2013) and Ḥorbat Rosh Zayit (Gal & Alexandre 2000: 68–80).

Type descriptions are usually structured so that a type code and label (name) appear as a heading in the text. The heading has a distinctive formatting in larger font, CAPITALS, *italics* and/or **bolding**. A list of occurrences at the site typically appears directly below the heading, arranged according to strata: as in the reports from Qasile (Mazar 1985), Timnah II & III (Mazar & Panitz-Cohen 2001; Panitz-Cohen 2006), Megiddo IV chapter 13 (Arie 2006), and Megiddo V (Arie 2013b, Martin2013), while in Ḥorbat Rosh Zayit the list does not include all examples of the described type and does not include the stratigraphic assignment of the illustrated items (Gal & Alexandre 2000: 27). Such lists were not included in the Hazor VI, Megiddo III, or Megiddo IV, chapter 12 pottery presentations. The running text describing each type starts with a relatively short description (or definition) of the vessel type or vessels included in the type. The descriptions use both singular (for type) and plural (for vessels of a type). The description may include measures of the vessel size or their capacities, either systematically for (almost) every type, as in Timnah II & III (Mazar & Panitz-Cohen 2001; Panitz-Cohen 2006), or less systematically for some types only, as in the report of Qasile (Mazar 1985); Megiddo IV, chapter 13 (Arie 2006); Megiddo V, chapters 10 and 13 (Martin 2013; Arie 2013b); while the vessel sizes appear seldom in the reports of Ḥorbat Rosh Zayit (Gal & Alexandre 2000) and Hazor VI (Ben-Ami & Ben-Tor 2013a, b; Ben-Ami et al. 2013). Size measures were fully absent from the pottery reports of Megiddo III (Ilan et al. 2000); Megiddo IV, chapter 12 (Gadot et al. 2006); and Megiddo V, chapter 12 (Arie 2013a). However, even in these reports the sizes can be deduced from the line-drawings that illustrate the vessels.

All reports also refer to ‘parallels’ or ‘comparanda’ to the described vessels. Most reports list these parallels (similar or reminiscent vessels from other sites) after the type descriptions, either as a list, as in Timnah III (Panitz-Cohen 2006), or Megiddo V, chapters 12 and 13 (Arie 2013a, b), or as a table after the description, as in Megiddo V, chapter 10 (Martin 2013), or included in the tables that accompany the illustrations, as in Hazor VI, chapters 5 and 6 (Ben-Ami & Ben-Tor 2013b; Ben-Ami et al. 2013), or as running text, as in the earliest reports under study: Qasile, Ḥorbat Rosh Zayit, and Timnah II (Mazar 1985; Gal & Alexandre 2000; Mazar & Panitz-Cohen 2001). Earlier interpretations of similar vessels are discussed in conjunction with the parallels.

There is always some kind of concluding discussion, although its placement within the excavation report varies. The summary and conclusions drawn from the presented pottery appear in three different positions. It often appears 1) as a distinctive section at the end of the pottery chapter, as in Hazor VI, chapters 1 and 6 (Ben-Ami & Ben-Tor 2013a; Ben-Ami et al. 2013); Megiddo IV, chapter 13 (Arie 2006); Megiddo V, chapters 10, 12, and 13 (Martin 2013; Arie 2013a, b). More or less as commonly it appears 2) as a separate chapter after the pottery typology (Mazar 1985), which often at the same time is at the end of the whole excavation report, as in Timnah II & III (Mazar & Panitz-Cohen 2001; Panitz-Cohen 2006) and Ḥorbat Rosh

Zayit (Gal & Alexandre 2000). As a third option, the conclusions may appear as short, separate sections within the pottery report, as in Megiddo III, chapter 9 (Ilan et al. 2000); Hazor VI, chapter 5 (Ben-Ami & Ben-Tor 2013b). The concluding discussions always discuss chronology. In addition, they include themes like 1) geographical setting, 2) economics, 3) commercial contacts, 4) social structures, and 5) ethnicity.

Introductions are the most varying part of the pottery reports. The themes that most commonly appear in the introduction are: 1) a general characterization of the assemblage, 2) its archaeological context, 3) a description of the retrieval and selection of pottery material, 4) the registration method, 5) quantification procedures, 6) a key to the presentation of the plates, 7) an understanding of the nature of the types, and 8) tables of the distribution of different types.

Those authors who provide a reflection on typology building do it in the introductory part of the typology. It is included in a section discussing methodology – which commonly appears as the heading. Such a section is relatively common, and appears in the reports from Qasile (Mazar 1985), Timnah II & III (Mazar & Panitz-Cohen 2001; Panitz-Cohen 2006), and Megiddo IV, chapter 13 (Arie 2006). A similar placement of such a section can be observed in other reports as well, such as the reports from ʿIzbet Sartah (Finkelstein 1986), Tel Qiri (Hunt 1987), and Beth-Shean I (Mazar 2006: 313–314) and II (Maier 2007: 242; Mullins 2007: 391). In reports from the time before the late 20th century such reflections are more often absent, while they grow in number after the linguistic turn in the humanities in western academia in the 1970’s (Clark 2004: 62; 145). However, the lack of such a reflection is not exceptional in later reports either, as in Kinneret I (Fritz 1990) and the more recent Hazor reports (Bonfil 1997; Ben-Tor & Ben-Ami 2012). A description of the difficult spots or problems in the practical work, or the principles used in typology building, is sometimes included in the introduction, or in the description of the types that were considered difficult to classify, such as certain bowls or jugs in general in the Qasile typology (Mazar 1985: 37, 61).

Classificatory work routinely hides the variety within the things classified together, and thus creating homogeneity in the materials. It is assumed that the materials carry consistent meaning(s) in different contexts. Classifications tend to focus on central tendencies and ignore gradients (Gero 2007: 320–321). Dichotomies are inherent to typological work: belonging to one group precludes belonging to other groups. This removes interpretative ambiguity from the scene (see also Gero 2007: 320; Langin-Hooper 2011). A vessel cannot be both a bowl and a krater – it can only be classified once (within one system). The ambiguity of types, type borders, and a vessel belonging to one or another type is sometimes included in the type descriptions (e.g. Mazar 1985) or in the general introduction (Mazar & Panitz-Cohen 2001: 11). Relating to archaeological work, Joan Gero has suggested that for archaeology it is “critical that the chains of decision making – become public and visible, showing where/why some data are – deemed ambiguous (or – determinant) – and others not” (Gero 2007: 324). Such reflective writing is not well represented in the pottery typologies in Israel-Palestine. However, there are notable exceptions, and such reflections are essential for communicating the varieties within classified materials. In the introduction to the pottery analysis of Qasile, Mazar expressed the difficulty of typology building on a general level:

> The next step was the building-up of a type-series for the pottery of str. XII-VIII. Such a series would facilitate the classification, discussion of the pottery as a whole and description of that pottery which was not to be illustrated. However, establishing a type-series was not an easy task; while in certain classes, there are homogeneous types, found in large numbers – in other classes there are many variations in profile, and sometimes it was impossible to find two similar vessels. […] Though effort was made to include most of the pottery in the typological classification, we found a good number of forms which appear only once or are exceptional. These were included as 'exceptional' or 'variations' in the discussion of the various forms. In other cases the fragment was *too small or too insignificant* to be included in the typological seriation. (Mazar 1985: 21–22, emphasis mine.)

The experience of similar difficulty has been expressed in the reports of Timnah II (Mazar & Panitz-Cohen 2001: 11–12) and Megiddo V, chapter 13, both discussing Iron Age II pottery (Arie 2013b: 672). The pottery report of the Late Bronze Age III and Iron Age I from Megiddo V, chapter 12 improves and updates an earlier report by the same author (Arie 2013a; Arie 2006). In the latter report, there is a rare chance to read how the typologist reconsidered some of his own earlier assignments and flaws (Arie 2013a: 485, 487, 490). There is an interesting feature that any (pottery) item can possess, and that affects its fate in the research process: its *significance*. If an item is considered to be significant, that is a reason to include it in the analysis (Mazar 1985: 22; Arie 2013a: 494), but unfortunately this central concept has not been defined. In the appendix of the Megiddo V, chapter 10 report of the Late Bronze Age IIB pottery, there is a revealing notion that "rims that were smaller than 3 x 3 cm were omitted from the count, first, because such rims may often originate from brick material and may thus be intrusive, and second, the classification of such small pieces is often impossible" (Martin 2013: 444). Similar reasoning appears in the chapter discussing methodology in Gezer III: "if a sherd is of sufficient size and has distinct characteristic points, its form and some of its other attributes can be classified" (Gitin 1990: 42). It seems that the ability of the typologist to assign an item to a class forms a criterion for an item to be significant.

The style of the reports is rather uniform. The descriptions of the vessels use the same concepts. The verbs that dominate the texts are those of 'being', 'belonging', and 'having.' In addition, vessels and vessel types 'appear', 'occur', 'continue', and 'disappear'. Vessels appear mostly in plural, while types are described in singular. Vessels are considered as being 'representatives' of a type or 'belonging to a type.' Types are generally written with capital initials, as proper names. Types appear on a textual level as something real. This is in tension with the general acknowledgment made in nearly all reports, that typologies are subjective, e.g. in the reports from Ḥorbat Rosh Zayit (Gal & Alexandre 2000:26), Timnah II (Mazar & Panitz-Cohen 2001: 11–12), and Hazor VI, chapter 5 (Ben-Ami & Ben-Tor 2012b: 411).

The agency in the reports tends to be hidden. Most pottery reports were written using the passive voice in the introduction and any possible conclusions. The active voice is well present in the descriptions of the vessels, where the active 'agents' are almost exclusively vessels, and possible other actions appear in the passive. However, the active 'I' or 'we' appear in several introductory sections alongside the passive (Qasile, Timnah II & III; Megiddo IV, chapter 12). The active researcher is present, especially in the sections that discuss the typology building. This action is often expressed with words that indicate the activity of the typologist, even if passive, like 'building' (Qasile, Mazar 1985: 21; Megiddo IV, chapter 13, Arie 2006: 191; Megiddo V, chapter 10: Martin 2013: 344), 'establishing' (Qasile, Mazar 1985: 21), 'creation' (Mazar & Panitz-Cohen 2001: 11), and choosing criteria for classification (Hazor VI, chapter 5, Ben-Ami & Ben-Tor 2012:411). Arie writes in the active voice throughout the Megiddo V reports, both for himself as the author and for the vessels in the type descriptions; however, this is alongside the passive voice, which is common as well (Arie 2013a and 2013b).

The illustrations of vessels form an integral part of the pottery typologies. All reports include several plates of line-drawings that depict the vessels. The line-drawings are most commonly placed as a separate section after the typology, while in the Hazor VI report the line-drawings appear after the chapter presenting the stratigraphy and architecture and before the typologies (2012), and in the report of Ḥorbat Rosh Zayit the line-drawings of different excavation areas are presented separately according to the areas, in addition to the division into three stratigraphic divisions in the Fort area (Gal & Alexandre 2000). In several reports, there are black-and-white photographs of single vessels or vessel groups throughout the type descriptions (all except Hazor VI, Megiddo III and Megiddo IV, chapter 12). In addition to the plates of line-drawings that are placed as a separate section, a figure presenting a 'typical' or 'good example' of each type is provided, that enables the reader to get a quick impression of the assemblage, as in reports of Megiddo IV and V (Arie 2006; 2013; Martin 2013) or Timnah (Mazar & Panitz-Cohen 2001; Panitz-Cohen 2006). At the same time this overview hides both the variety within the types and the fuzzy borders between them.

The common practice of giving only a few illustrations of a type (e.g. Gilboa 1995: 1) hides the actual variety of items included in a type. The types are not similar in their inner variation or in the sharpness of their boundaries. Focusing on complete profiles leads to over-representation of special spatial and temporal units with well-preserved material. Problems with sample size are thus likely to arise, if the use of statistics is aimed at (see Gilboa et al. 2004). There have been efforts towards more *objective* typologies with the help of statistics, or mathematical functions calculated for vessel profiles (Gilboa et al. 2004). The typological groups are constructed by clustering of the profile functions, weighted at points of special interest. Inside the formed groups an [arithmetic] mean can be calculated and a virtual prototype thus created (Gilboa et al. 2004: 681–687). However, using the mean as the statistic for something typical has the drawback that it is strongly affected by exceptional values. Thus, a median would better represent something typical. The suggested building of a virtual prototype also neglects the important aspect of variety in the groups. An *average* example of a type is often an idealized figure that is actually not *typical*, if present in the material at all (Klejn 1982: 43). The weights given have to be decided by the researcher, as well as the values that could be given for other features, like colors or tempering materials – things that will affect the constructed groups. The reasoning for the weights is not discussed in detail, but only referred to as the possibility to give preference to archaeologically significant features (Gilboa et al 2004: 684). The subjectivity inevitably included is clear. It does not, however, play down the important advantage that the decisions will have to be *explicit,* and thus more open for the readers, who are able to evaluate the process. The method also promotes consistency of treatment for the whole corpus that is studied.

There are two common features in recent typologies that easily result in complicated typologies with incoherent types. First, the types or subtypes are formed according to special features, like the multitude of handles, spoon on flask mouths, base form, or painted decorations that have been considered good chronological markers, but which can be observed on well preserved vessels and not on the vast majority of the shard material to be sorted. Therefore, these types are problematic for the majority of finds that will be sorted, as the specific feature is often absent because of the state of preservation of the sorted fragments, not because of its absence on the original artefact. They are also not exclusive in relation to each other. In the typologies for Qasile (Mazar 1985), Timnah (Mazar & Panitz-Cohen 2001; Panitz-Cohen 2006), and the Megiddo Iron Age I assemblage (Arie 2006), these kinds of types and subtypes are rather common. Another common way of defining types is on the basis of the rim form, as in the typologies of Tell Qiri, a village excavated in 1975–1977 (Hunt 1987), and Yoqneᶜam II, an urban site excavated in 1977–1988 (Zarzcecki-Peleg et al. 2005), where the types were foremost divided according to rim forms. It is a major defining attribute of types and sub-types in the other reports as well. The rim form is well represented in the shard material, and in this sense it is a good attribute for type definition. It also easily leads to a very large amount of types and subtypes. The desire to attain types that are culturally and chronologically significant seems to be connected with the practice of creating complex typologies with a multitude of types established upon minute differences. However, ethnographic studies have shown that there is an inevitable variation in all hand-made pottery, especially in the details of rim forms (Miller 1982: 42). The recognized differences may be chronologically irrelevant. For example, when “Dales ware” in Roman Britain was studied in morphological detail, with the result that the “Dales ware cannot truly be said to have developed in any logical or recognizable fashion” (Loughlin 1977: 90; Peacock 1982: 162).

2.5.3 Pottery Descriptions in the Excavation Reports of Timnah

Probably the most detailed accounts of the process of making a typology are included in the reports of Qasile (Mazar 1985) and Timnah II (Mazar & Panitz-Cohen 2001). Shorter descriptions are included in the excavation reports of Timnah III (Panitz-Cohen 2006), Tel Beth-Shean (Mazar 2001, Maier 2007, Mullins 2007 and Panitz-Cohen 2009), Tel Yin’am (Liebowitz 2003), and Megiddo (Arie 2006; Arie 2013a, 2013b). The report on Timnah II is detailed in its account of type formation, and thus more explicit than most reports in this regard. Therefore, I will consider it here in some detail. In general, its arrangement and style can be considered typical for the site reports.

The processing of the pottery at Timnah was based on a system earlier used at Tell Qasile, but modified (Mazar & Panitz-Cohen 2001: 10). Tell Qasile was excavated from 1971–1974, and the publication of the stratigraphy and architecture was published in 1980 (Mazar 1980). The volume presenting the finds came out in 1985. Already at Tell Qasile, the process was to keep and analyze all rims and decorated shards, and a selection of handles and bases from all stratified loci (Mazar 1985: 21–22). At Tell Qasile, the pottery of strata XII –VIII (from 12th to 10th century, the focus of the 1970's excavations) is presented in a type-series, where each vessel type and sub-type is discussed separately. Following this method, a detailed type series was built at Timnah. The type descriptions concentrate on form and surface treatment. The fabrics are discussed separately, and while the fabric groups are included in the section for pottery, it forms an isolated sub-chapter that is rarely referred to in the typological presentation in the following sub-chapter (Mazar & Panitz-Cohen 2001: 15–24; 30–144; 157; see also Panitz-Cohen 2006; Cohen-Weinberger 2006).

The orientation of the artifact studies was essentially chronological and culture-historical (Mazar & Panitz-Cohen 2001: XI; 10; Panitz-Cohen 2006: XIII). In addition, the material was used for spatial-functional analyses of the architectural units (Mazar & Panitz-Cohen 2001: 10). The pottery was studied according to a typological classification in conjunction with stratigraphy (Mazar & Panitz-Cohen 2001: XI). Material in the plates is arranged according to architectural units. Pottery presented in the plates includes all the complete vessels and a "large and representative collection" of shards. A "maximum amount" of the homogeneous assemblages' content was presented as "objectively and comprehensively as possible", reflecting the development of pottery. Shards that could be classified typologically and originated from stratified loci were also processed (Mazar & Panitz-Cohen 2001: 1). The selection of pottery to be drawn was explained as well: "the pottery selected for drawing is a representative sample, depicting entire assemblages alongside examples of all types from every stratum. Repetition in the graphic presentation was often found necessary in order to emphasize small variations" (Mazar & Panitz-Cohen 2001: 10–11). "The emphasis is on presenting all the complete vessels and representative shards from well-defined units belonging to each architectural and stratigraphic horizon" (Panitz-Cohen 2006: 3). It is noteworthy that the term "representative" is used in a twofold meaning. First, it defines a collection of shards, giving the impression that the collection is a representative sample of all pottery shards; later, the term defines shards themselves as if it would refer to certain kinds of shards, like those with a larger part preserved.

The Timnah type-series is taxonomy with a *class* as the uppermost category, and the type with a narrower definition in the next step. Types are sometimes further divided into sub-types. There are ten functionally determined classes in the discussion of strata IV–II (bowls, chalices, kraters, amphorae, cooking pots, storage jars, jugs, juglets, bottles, and lamps) and 21 classes in the discussion of strata XII–V (in addition to the classes above there were goblets, pithoi, biconical vessels, stirrup jars, flasks, a pyxis, a cup-and saucer, funnels, stands, imports, and amphoriskoi instead of amphorae). In the presentation, several types are grouped under common morphological headings. The types were determined on several criteria. Preferably whole forms were used as prototypes, but several types were also defined on the basis of rim form.

A fundamental practical necessity for a type definition was the ability to attribute shard material to a certain type (Mazar & Panitz-Cohen 2001: 11; see Adams & Adams 1991: 77–89). It is stated that the authors aimed at type definitions that would be mutually exclusive. This was done by creating broad categories for types and small variations for differentiating sub-types. The method proved difficult, and it is admitted that types differ in their homogeneity, which is discussed for each type separately. It is also expressed that the typology is subjective and has no intrinsic value, but is a tool for organizing and discussing the material in a meaningful way (Mazar & Panitz-Cohen 2001: 11–12; see also Adams & Adams 1991: 48–49). An idea of "true" types is related to the variability of the classified material: a type can be considered true if the vessels are homogenous in form (Mazar & Panitz-Cohen 2001: 12).

From strata IV–II, 15 002 vessel items were analyzed, including shards and complete vessels (Mazar & Panitz-Cohen 2001: 12). The amount of data was reduced in quantitative analyses to include only complete vessels and *indicative* shards, with a total of 7027 pottery finds: 1408 well preserved vessels and 5619 shards (Mazar & Panitz-Cohen 2001: 24). The material analyzed from the earlier strata XII–V was less, 2806 finds all together, where 2251 were shards (Panitz-Cohen 2006: 10). This material includes a time sequence from Middle Bronze Age IIB to Iron Age I/IIA (Panitz-Cohen 2006: XIV).

In the presentation of the smaller corpus of material from a longer time sequence (Panitz-Cohen 2006: 27–120), the amount of types and sub-types is especially large. For example, the *Bowls* (1041 items) were divided into 28 types and 15 vessels were illustrated as varia. There are eleven types with five or less finds, and four types with one or two finds. *Kraters* (a deep vessel form between bowls and jars) included 252 items all together, and were divided into 11 types with 38 vessels being described as varia. Of these types, six include two or three items only. *Storage jars* (515 finds) were divided into 11 types (and 51 in varia). Two types included three or four finds. Both of these types were defined based on a feature that could not be observed on most shards (painted decoration and four handles on body). *Juglets* (50 finds) were divided into three types, two of which included two finds and the third type eight finds. Most of the juglets were confined to the broader definition of the class only (38 finds). This class well exemplifies what happens when types are formed based on complete vessels, but the sorted material mainly consists of shards: many types do not really materialize. *Flasks* numbered all together 14, divided into three types, two of which only included one find. Type FL3 (flask with a spoon) is defined according to a feature that can only be observed if the rim part is preserved (3 of the 7 illustrated examples were not). Thus the types are not mutually exclusive. *Amphoriskoi* (a specific jar type with handles at the neck or rim) number only three, and still they are divided into two types, one of which is still divided into two sub-types – each vessel is thus described individually. The typology of the pottery from Yoqneᶜam is in many respects similar to that of Timnah in the structuring and division of types and sub-types (Zarzecki-Peleg et al. 2005).

Types that only include one vessel from the site are a relatively common phenomenon in the pottery typologies. There were more than ten single-item-types or sub-types in the report on

Qasile (Mazar 1985) and the Iron Age I typology from Megiddo (Arie 2006), and seven in the report on the Late Bronze Age IIB pottery from Megiddo (Martin 2013). The resulting complexity of types and subtypes is not exceptional, as is demonstrated by the table in Fig. 2.2. The sites included in the table include Iron Age pottery presentations, in order to have to some extent comparable assemblages. Some representations prefer many types defined in detail, and others tend to have broad groupings including variability. It is probable that the material and its heterogeneous or homogeneous nature, as well as the aims of the sorting researcher and his/her sensitivity towards the sorted material, all play a role.

Site report	time sequence	classes	types in a class			total of types	sub-types			total of types & sub-types
			Mode[3]	mean $\bar{x}$	max		Mode[4]	max	total	
Beth-Shean I	Iron I	11	3 & 5	3	5	33	0	4	19	52
Beth-Shean I	Iron II	13	1	4.8	11	62	2	2	6	68
Beth-Shean III	Iron I	16	1	2.9	9	46	2	7	22	68
Dor I	Iron II	11	2	12-13	40/47	96 - 104	2	4	52	148/156
Megiddo IV	Iron I	16	2	4.6	11	69	2	4	27	96
Qasile	Iron I	15	2	4.6	18	65	2	4	23	88
Tell Qiri	Iron I	22	6	4	7	52	3	6	63	115
Timnah II	Iron II	10	2	9	26	99	2	5	41	140
Timnah III	MB IIB–Iron I	21	3	5.2	23	89	2	8	38	127
Yoqneᶜam II	Iron I – II	12	3	6.2	11	74	5	24	66	140

Fig 2.2 Amount of presented classes, types and sub-types in the pottery presentations. References: Dor (Gilboa 1995), Qasile (Mazar 1985), Megiddo (Arie 2006), Timnah II (Mazar & Panitz-Cohen 2001), Timnah III (Panitz-Cohen 2006), Tell Qiri (Hunt 1987), Yoqneʿam (Zarzecki-Peleg 2005), Beth-Shean I (Mazar 2006a for Iron Age I, Mazar 2006b for Iron Age II) and Beth-Shean III (Panitz-Cohen 2009).

2.6 Typology Formation at Tel Kinrot

The process of typology formation for the Tel Kinrot ceramics is explained in detail in section 5.1, just before the description of the types. The section is forcefully subjective, because I have made the typology by myself. The Tel Kinrot pottery typology is the only typology that I have made, so there cannot be comparisons in depth of the processes of making a typology. Such a comparison would have required interviews with pottery specialists and would probably make an interesting project of its own. A few main points suffice at this point:

I consider a typology a modern scholarly construction that is foremost a practical tool of an archaeologist, not a re-production of ancient categories. Therefore, typologies should be evaluated according to their purposes, which in Israel-Palestine are generally communicative and chronological. Typological classification is based on a combination of *tradition* and grouping of *new material.* Tradition indicates previous research, foremost earlier typologies of comparable materials. Tradition also includes inherited wisdom about what kind of features should

[3] Mode is the most common amount of types in a class. Minimum is always 1.
[4] Mode for sub-types: the types without divisions are left out and thus the practical minimum is 2.

be considered important. The tradition gives typological work a flavor of continuity that reflects the "conservatism and imitativeness as human characteristics" that Kenyon gave as a reason for similar vessels being contemporaneous (1979: 15). On the other hand, each typology is based on and made for a unique assemblage of materials. In order to suit the new material to be sorted, the typology has to be modified because of the distinctive features of the assemblage at hand. A good typology is loyal both to its material (the pottery) and to its audience (the readers). The first means that the typology is guided by the material: the features that are selected to be determinant for a type really vary within the whole assemblage, so that they make a real difference between types. Another aspect that reflects adherence to the material is that as few items as possible are border-line cases. However, because the typology is artificial, some discrepancies will be inevitable. Loyalty to the audience, then, indicates that type boundaries are explicitly stated, and even though the products of handicrafts are to some extent always unique, one-item-types should be avoided in order to create a typology that is not too confusing. The types may vary as to their cohesion, and this should be told to the readers.

Figure 2.3 includes line drawings of vessels from Tel Kinrot, published in Near Eastern Archaeology 74 (2011) with the title "The pottery assemblage at Tel Kinrot." The drawing includes both common and exceptional types, and may serve the reader by giving an impression of the variety of vessel types that appear at the site. However, most material that I have sorted is shards, and therefore different to work with (see examples in Figs. 2.4–2.5). The well preserved material was a necessary body of "study material" needed in order to be able to identify types within the shards, as the vessel types that I created were based on ideas of whole vessels. I even drew prototypes based on occurring vessels, but imaginary as such. I found such idealizations helpful while sorting the material, and some of those prototypes will appear in section 5.2.

Within the typology of Tel Kinrot (chapter 5.2) I present the methodological aspects in detail, including the selection of material, type formation, and recording processes. I will be explicit about the type defining characteristics and discuss the borders between types that are somehow close. I have also decided to include a picture of a vessel that I have considered typical of most types along with the descriptive text, while all drawings appear in the appendices of chapter 5. However, I have also described the variation within the types. In modern excavation reports in general and the forthcoming final report of Tel Kinrot alike, the pottery is arranged according to their contexts. However, in this study, I have arranged the pottery plates according to the vessel types, because the typological work itself is the focus of this study. Typological studies are often used as a basis for historical as well as social research. However, it is important to assess the tool itself, as the validity of the subsequent research is dependent on the validity of the tools used in the first place.

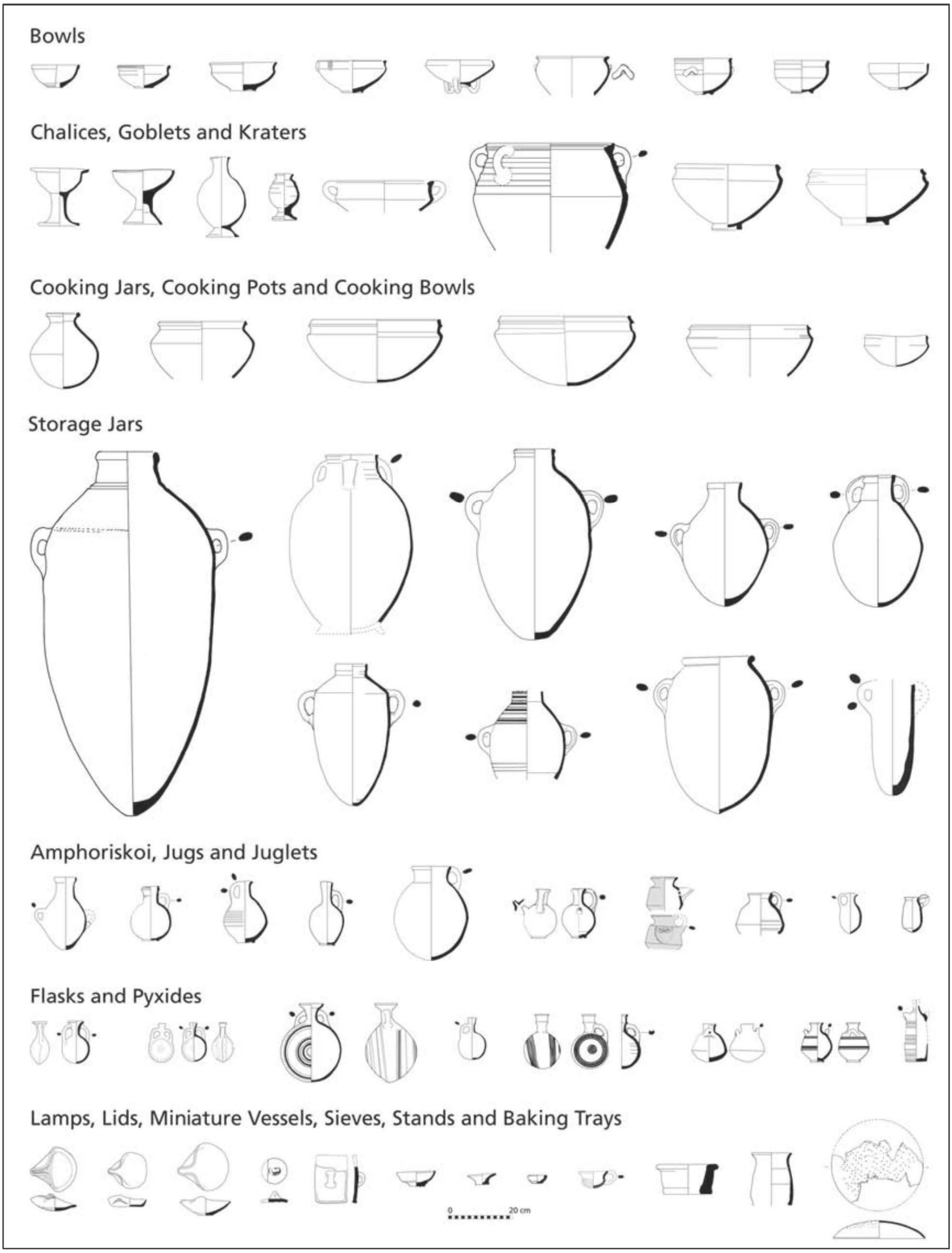
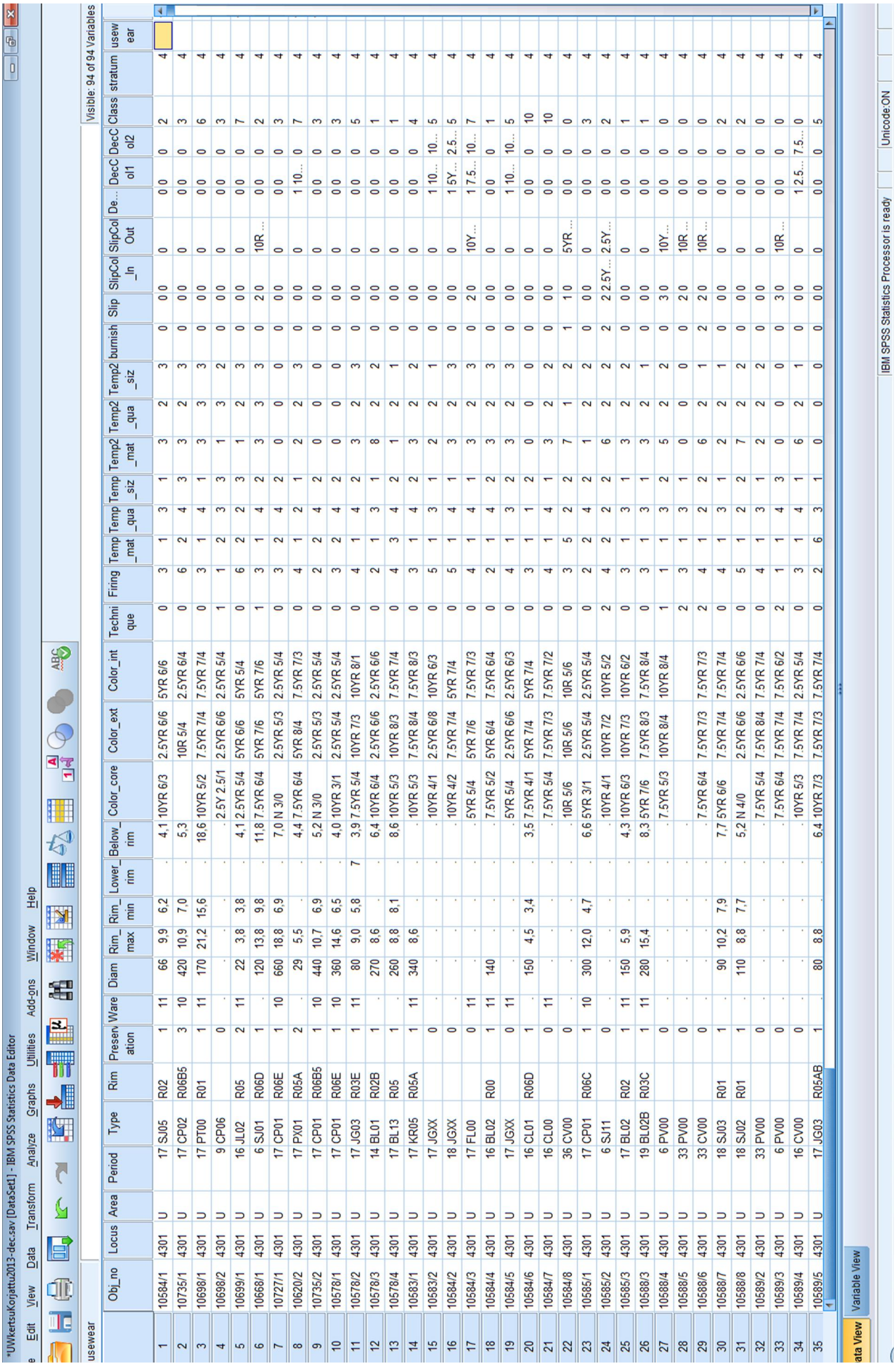


Fig. 2.3. Examples of vessels from Tel Kinrot. Note that there is one jug and one juglet in the middle of the row of flasks and pyxides. Drawings by Christa Lennert, Michael Miles and Marina Zeltser, © KRP, published by Münger et al. 2011: 83.



	Obj_no	Locus	Area	Period	Type	Rim	Preservation	Ware	Diam	Rim_max	Rim_min	Lower_rim	Below_rim	Color_core	Color_ext	Color_int	Technique	Firing	Temp_mat	Temp_qua	Temp_siz	Temp2_mat	Temp2_qua	Temp2_siz	burnish	Slip	SlipCol_In	SlipCol Out	De...	DecCol1	DecCol2	Class	stratum	usewear
1	10584/1	4301	U	17	SJ05	R02	1	11	66	9,9	6,2	.	4,1	10YR 6/3	2.5YR 6/6	5YR 6/6	0	3	1	3	1	3	2	3	0	0	0	0	0	0	0	2	4	
2	10735/1	4301	U	17	CP02	R06B5	3	10	420	10,9	7,0	.	5,3		10R 5/4	2.5YR 6/4	0	6	2	4	3	3	2	3	0	0	0	0	0	0	0	3	4	
3	10698/1	4301	U	17	PT00	R01	1	11	170	21,2	15,6	.	18,6	10YR 5/2	7.5YR 7/4	7.5YR 7/4	0	3	1	4	1	3	3	3	0	0	0	0	0	0	0	6	4	
4	10698/2	4301	U	9	CP06		0	.	.	.	.	.	.	2.5Y 2.5/1	2.5YR 6/6	2.5YR 5/4	1	1	2	3	3	1	3	2	0	0	0	0	0	0	0	3	4	
5	10699/1	4301	U	16	JL02	R05	2	11	22	3,8	3,8	.	4,1	2.5YR 5/4	5YR 6/6	5YR 5/4	0	6	2	2	3	1	2	3	0	0	0	0	0	0	0	7	4	
6	10668/1	4301	U	6	SJ01	R06D	1	.	120	13,8	9,8	.	11,8	7.5YR 6/4	5YR 7/6	5YR 7/6	1	3	1	4	2	3	3	3	0	2	0	10R ...	0	0	0	2	4	
7	10727/1	4301	U	17	CP01	R06E	1	10	660	18,8	6,9	.	7,0	N 3/0	2.5YR 5/3	2.5YR 5/4	0	3	2	4	2	0	0	0	0	0	0	0	0	0	0	3	4	
8	10620/2	4301	U	17	PX01	R05A	2	.	29	5,5	.	.	4,4	7.5YR 6/4	5YR 8/4	7.5YR 7/3	0	4	1	2	1	2	2	3	0	0	0	0	1	10...	0	7	4	
9	10735/2	4301	U	17	CP01	R06B5	1	10	440	10,7	6,9	.	5,2	N 3/0	2.5YR 5/3	2.5YR 5/4	0	2	2	4	2	0	0	0	0	0	0	0	0	0	0	3	4	
10	10578/1	4301	U	17	CP01	R06E	1	10	360	14,6	6,5	.	4,0	10YR 3/1	2.5YR 5/4	2.5YR 5/4	0	3	2	4	2	0	0	0	0	0	0	0	0	0	0	3	4	
11	10578/2	4301	U	17	JG03	R03E	1	11	80	9,0	5,8	7	3,9	7.5YR 5/4	10YR 7/3	10YR 8/1	0	4	1	4	2	3	2	3	0	0	0	0	0	0	0	5	4	
12	10578/3	4301	U	14	BL01	R02B	1	.	270	8,6	.	.	6,4	10YR 6/4	2.5YR 6/6	2.5YR 6/6	0	2	1	3	1	8	2	2	0	0	0	0	0	0	0	1	4	
13	10578/4	4301	U	17	BL13	R05	1	.	260	8,8	8,1	.	8,6	10YR 5/3	10YR 8/3	7.5YR 7/4	0	4	3	4	2	1	2	1	0	0	0	0	0	0	0	1	4	
14	10583/1	4301	U	17	KR05	R05A	1	11	340	8,6	.	.	.	10YR 5/3	7.5YR 8/4	7.5YR 8/3	0	3	1	4	2	3	2	2	0	0	0	0	0	0	0	4	4	
15	10583/2	4301	U	17	JGXX		0	.	.	.	.	.	.	10YR 4/1	2.5YR 6/8	10YR 6/3	0	5	1	3	1	2	2	1	0	0	0	0	1	10...	10...	5	4	
16	10584/2	4301	U	18	JGXX		0	.	.	.	.	.	.	10YR 4/2	7.5YR 7/4	5YR 7/4	0	5	1	4	1	3	2	3	0	0	0	0	1	5Y...	2.5...	5	4	
17	10584/3	4301	U	17	FL00		0	11	.	.	.	.	.	5YR 5/4	5YR 7/6	7.5YR 7/3	0	4	1	4	1	3	2	3	0	2	0	10Y...	1	7.5...	10...	7	4	
18	10584/4	4301	U	16	BL02	R00	1	11	140	.	.	.	.	7.5YR 5/2	5YR 6/4	7.5YR 6/4	0	2	1	4	2	3	2	3	0	0	0	0	0	0	0	1	4	
19	10584/5	4301	U	17	JGXX		0	11	.	.	.	.	.	5YR 5/4	2.5YR 6/6	2.5YR 6/3	0	4	1	3	2	3	2	3	0	0	0	0	1	10...	10...	5	4	
20	10584/6	4301	U	16	CL01	R06D	1	.	150	4,5	3,4	.	3,5	7.5YR 4/1	5YR 7/4	5YR 7/4	0	3	1	1	2	0	0	0	0	0	0	0	0	0	0	10	4	
21	10584/7	4301	U	16	CL00		0	11	.	.	.	.	.	7.5YR 5/4	7.5YR 7/3	7.5YR 7/2	0	4	1	4	1	3	2	2	0	0	0	0	0	0	0	10	4	
22	10584/8	4301	U	36	CV00		0	.	.	.	.	.	.	10R 5/6	10R 5/6	10R 5/6	0	3	5	2	2	7	1	2	1	1	0	5YR ...	0	0	0	0	4	
23	10585/1	4301	U	17	CP01	R06C	1	10	300	12,0	4,7	.	6,6	5YR 3/1	2.5YR 5/4	2.5YR 5/4	0	2	2	4	2	1	2	2	0	0	0	0	0	0	0	3	4	
24	10585/2	4301	U	6	SJ11		0	.	.	.	.	.	.	10YR 4/1	10YR 7/2	10YR 5/2	2	4	2	2	2	6	2	2	2	2	2.5Y...	2.5Y...	0	0	0	2	4	
25	10585/3	4301	U	17	BL02	R02	1	11	150	5,9	.	.	4,3	10YR 6/3	10YR 7/3	10YR 6/2	0	3	1	3	1	3	2	2	0	0	0	0	0	0	0	1	4	
26	10588/3	4301	U	19	BL02B	R03C	1	11	280	15,4	.	.	8,3	5YR 7/6	7.5YR 8/3	7.5YR 8/4	0	3	1	3	1	3	2	1	0	0	0	0	0	0	0	1	4	
27	10588/4	4301	U	6	PV00		0	.	.	.	.	.	.	7.5YR 5/3	10YR 8/4	10YR 8/4	1	1	1	3	2	5	2	2	0	3	0	10Y...	0	0	0	0	4	
28	10588/5	4301	U	33	PV00		0	.	.	.	.	.	.				2	3	1	3	1	0	0	0	0	2	0	10R ...	0	0	0	0	4	
29	10588/6	4301	U	33	CV00		0	.	.	.	.	.	.	7.5YR 6/4	7.5YR 7/3	7.5YR 7/3	2	4	1	2	2	6	2	1	2	2	0	10R ...	0	0	0	0	4	
30	10588/7	4301	U	18	SJ03	R01	1	.	90	10,2	7,9	.	7,7	5YR 6/6	7.5YR 7/4	7.5YR 7/4	0	4	1	3	1	2	2	1	0	0	0	0	0	0	0	2	4	
31	10588/8	4301	U	18	SJ02	R01	1	.	110	8,8	7,7	.	5,2	N 4/0	2.5YR 6/6	2.5YR 6/6	0	5	1	2	2	7	2	2	0	0	0	0	0	0	0	2	4	
32	10589/2	4301	U	33	PV00		0	.	.	.	.	.	.	7.5YR 5/4	7.5YR 8/4	7.5YR 7/4	0	4	1	3	1	2	2	2	0	0	0	0	0	0	0	0	4	
33	10589/3	4301	U	6	PV00		0	.	.	.	.	.	.	7.5YR 6/4	7.5YR 7/4	7.5YR 6/2	2	1	1	4	3	0	0	0	0	3	0	10R ...	0	0	0	0	4	
34	10589/4	4301	U	16	CV00		0	.	.	.	.	.	.	10YR 5/3	7.5YR 7/4	2.5YR 5/4	0	3	1	4	1	6	2	1	0	0	0	0	1	2.5...	7.5...	0	4	
35	10589/5	4301	U	17	JG03	R05AB	1	.	80	8,8	.	.	6,4	10YR 7/3	7.5YR 7/3	7.5YR 7/4	0	2	6	3	1	0	0	0	0	0	0	0	0	0	0	5	4	

Fig. 2.4. Screenshot of pottery recording into a statistical data set. For variables, see sections 5.3.

Fig. 2.5. Shards from Locus 4301, baskets 10578 (shards 10578/1, 2, 3 and 4), 10583 (shards /1, 2), 10584 (/2, 3, 4, 5, 6, 7, 8), 10585 (/1, 2), 10588 (/3, 4, 5, 6, 7, 8), 10589 (/2, 3, 4, 5), 10603 (shard /1) and 10607 (/1, 2, 3).

2.7 Statistical Approach to Pottery

Archaeological inference is dependent on the supposition that the material culture of ancient people reflects something inherent in the culture and life of those people. The patterns that are detected in the material can be interpreted in terms of culture. The similarities as well as differences between artifacts reflect in a systematic way something related to the culture that produced and used them (see e.g. Rice 1987: 274–275). What are now archaeological materials were once part of a living culture, and inferences of this culture should be obtainable through it. However, the ancient population is reached only by inferences. The remains are partial at any site due to the processes active in the formation of the archaeological record (discard patterns etc.) by the ancient population, as well as everything that might afterwards affect the deposited material (like scavenging) before the modern excavation. Links between the materials that are collected into data sets and the human activities in the past have been called middle range theories (Johnson 1999: 48–61). The basic idea is that information that is independent of the archaeological observations may be used to falsify or validate the interpretation of archaeological materials (Binford 1980: 13–19; Yu et al. 2015:3). It is important that the reasoning and analogies are explicitly stated so that they may be evaluated.

The human mind is inclined to see patterns even in cases where there are none, and to be blind to unexpected phenomena if one is focusing on something else, or if the phenomenon is not a dramatic one (Kahneman 2011). Both these restrictions can be compensated for by using statistics. The impressions one has of an existing pattern can be tested. This is possible to do by using statistical tools that may expose a difference between two things (like decoration on jars being less common in a later phase than the previous one), as well as whether a co-occurrence of some features is due to chance rather than reflecting a real difference. Statistical testing allows one to define the statistical significance of any measurable difference or co-occurrence. At the same time, statistical tools enable one to detect small scale variations that would easily go unnoticed if not expected. The use of statistical tools for classification is essentially heuristic – as are the traditional, more intuitive ways of typological work as well. Another benefit is the consistent treatment of the material. It is easy to check how observed features and typological assignations fit together, that is if the patterns are constant. As a result, this can be used in *confirming the typological groups, or, if the patterning is weak, exposing a reason to reconsider them*.

The most commonly used statistical tools in pottery studies in Israel-Palestine are descriptive statistics. The descriptive summary methods include frequency tables of pottery types according to areas and phases (e.g. Arie 2006, Panitz-Cohen 2009, section 5.2) and/or graphic frequency presentation of the same data in trend lines (Hunt 1987), bar-charts (e.g. Bunimowitz & Finkelstein 1993; Mazar & Panitz-cohen 2001; Zarzecki-Peleg et al. 2005), or pie-charts (Gal & Alexandre 2000; Liebowitz 2003), along with the tables. The frequency information is then used to indicate differences between the settlement layers, or areas within a site or between sites. This summarizing information of the pottery assemblage is indeed useful when assemblages from different sites are compared, and local developments in pottery tradition are explored. In most cases it is also needed because the vast amount of the material would otherwise be incomprehensible without organizing it through typology combined with frequency data. The descriptive methods are also the requisite first step for more advanced analyses. Type and feature frequencies and distributions of measured features like length or thickness are needed for more complicated statistical analyses. However, such more detailed analyses are usually lacking in pottery reports, even though interactions between the different observed details might be highly interesting. This is a gap I wish to fill in for the Tel Kinrot material, by testing the significance of some differences as well as looking for associations between features like tempering and vessel form.

The summary descriptive statistics do not necessarily aim at generalizations. As long as one is only describing the features within the assemblage at hand, there are no strict demands on the collection of data and its representativeness for a certain, defined population. At the moment one aims at defining a relationship or difference within the “real” world that was once there, and of which the materials derive from, one is faced with higher standards of data retrieval. This is because the analysis, in order to be trustworthy (i.e. reliable and valid) has to be based on material that can be considered representative for the defined original population (see below). It is good to remember that the frequency tables of vessel classes and types are dependent on the typology according to which the material was sorted. Variation within the defined types is rarely discussed in any detail in pottery reports in Israel-Palestine. In the pottery typology (section 5.2) I have included tables, as well as pie-charts, of the frequency of the types I have created and identified in the material. In addition, I have presented some information on the variability of rim forms and diameters within the vessel types (in histograms and box-plots). I also tested if there were statistically significant differences for certain features, like rim diameter, between vessels of same type from different stratigraphic layers (section 5.3). The results indicated that there was a real difference only in some vessel types (cooking ware), and only between some of the stratigraphic phases. Such results are rather easy to explain for a continuous settlement with a relatively short time span.

It is nowadays customary to use computer registration of pottery finds (e.g. Gal & Alexandre 2000). However, it is rare that the readers are given details of the registration: what kind of features have been recorded and how they have been measured, not to speak of the actual data, including the measurements of all recorded items. The last mentioned would in most cases make a vast and a hardly readable catalogue (like the appendices in Schmidt 2013). However, providing the information as a table on a web site of an excavation would be feasible, and could be used by all interested. There are also some excavations in Israel that have opened up the registration process and the details that were selected to be measured: the projects at Tell Qasile (Mazar 1985), the Yoqneʿam Regional Project (Hunt 1987), and Timnah (Mazar & Panitz-Cohen 2001), as well a set of 356 vessels from Tell es-Safi (Zweig 2012: 432–433). Two projects lead by Pfälzner in Northern Syria present the registered variables in detail as well (Pfälzner 1995: 10–12; Schmidt 2013: 7–22). Many reports leave such information out, such as the reports on the excavations at Tel Yin'am (Liebowitz 2003), Tel Miqne-Ekron (Meehl et al. 2006), and Tell Abu al-Kharaz (Fischer 2013), as well as series of the renewed excavations at Tel Beth Shean (Mazar 2006; ed. by Mazar & Mullins 2007; ed. by Panitz-Cohen & Mazar 2009), Megiddo (ed. by Finkelstein et al. 2006; ed. by Finkelstein et al. 2013), and Tel Dor (ed. by Stern 1995).

Surface treatment of slip, burnish, and decoration were recorded separately in the published systems of Tell Qasile (Mazar 1985: 22–24) and the Yoqneʿam Regional Project (Hunt 1987: 220–223). Such features must have also been recorded in the renewed Megiddo projects, at least for the Iron Age material discussed by Arie (2006, 2013a, 2013b). Even though the recorded details were not given, the discussion and tables concerning the decoration techniques indicate that the surface treatments were recorded in detail. Details concerning the clay (color, inclusions) were recorded at Tell Qasile (Mazar 1985: 21), at Tell Šēh Ḥamad (Pfälzner 1995: 10–12), and at Tall Mozan (Schmidt 2013: 10–11). While the descriptions of pottery types usually include some discussion of the vessel sizes, it is surprising how the size related features seem to be absent from recording sheets. The size measurements have been included in the published recording system for material from Tell Šēh Ḥamad (Pfälzner 1995: 10–12), Tall Mozan (Schmidt 2013: 20–21), and in the study of the Tell Zarʿa po. ery (Dijkstra et al. 2009: 58). In order to provide a reader unfamiliar with statistical work a glimpse at the practical work, a screenshot of the Tel Kinrot recording sheet appears in Fig. 2.4, and a photo in Fig. 2.5 includes shards that appear to me as normal for the kind of material I have analyzed. All measured features and the method of their measuring is explained in detail in section 5.3.

While the size related features are not commonly reported in the recorded details, they are inherently taken into account in the typologies, as the vessel sizes are built in the typological classifications (as in section 5.2). The volumes of many well preserved vessels have been published in several reports from the 21st century (e.g. Panitz-Cohen 2009, Martin 2013 and Fischer 2013). Volumes can be calculated when the vessel profile can be reconstructed. In this respect, the fragmentary nature of most archaeological assemblages restricts the amount of vessels for which the volume can be counted. While the rim diameter or circumference is a far more readily available feature, it would be desirable to establish its relation to other size-related features. Such a trial has been made for the cooking pots from Iron Age Cooking pots at Tell Zarʿa, where a stable relationship between rim circumference and original surface was found (Dijkstra et al. 2009: 58–61). However, in order to be reliable, such a study requires that the vessel form is approximately constant, or that the changes are known and follow a pattern that can be identified and given some approximation.

There are some concepts that in their statistical use have a somewhat more restricted meaning than their use in common language. Such concepts include terms like population, representativeness, bias, reliability, and validity. *Population* in statistics means the totality of all the items of interest for the study that can be studied, like all Finnish school kids, or all European sea bass in the Mediterranean Sea. The trustworthiness of the collected data is related to its *representativeness*. It is important to be clear about what the *target population* is, for which the *sample* should be representative. Ideally, the sample is drawn from the population so that each item in the population has an equal chance to be included in the sample, regardless of its properties (except for the property of belonging to the target population). However, the target population is commonly slightly different from the *sampled population*, from which the actual sample is drawn (e.g. not all school kids were included in the lists that were used for sampling), and the sampling often does not fulfill the requirement of randomness because of missing observations (e.g. not all those schoolkids that were sampled randomly from the lists were actually reached). The things that are missing tend to be not random, and therefore the samples that we have as our data include some *bias*.

As for the Tel Kinrot ceramics, the target population could be all the pottery vessels produced and used at the site during its settlement (in the Iron Age), while the sampled population would be all the pottery that was preserved through the centuries and is in principle available for study through excavation. The sample would be the pottery actually excavated (including also ceramics deriving from periods before our target of the Iron Age). This sample is inevitably a *biased* one. This is because some ceramic items are more prone to disappear because of their ware and post-depositional conditions (for example, brittle shards on a trampled location). Some items are more easily missed or overlooked during the excavation (like small and/or worn shards from mixed deposits), while vessels in certain kinds of contexts (like sealed floor assemblages) are better preserved, identified, and studied. Such factors cannot be controlled by the researcher. The retrieval strategy then is a sample of a (biased) sample. At Tel

Kinrot, the pottery from the areas excavated with an intensive retrieval strategy can be considered as a representative sample of all *excavated* pottery, because keeping and studying all the rim shards should bear a relationship to all excavated ceramics. Even though the different vessel types when broken will produce different amounts of rims, the discrepancies between the vessel types can be estimated. However, it would require a thorough study of possible processes related to discard and various later formation processes at the site to arrive at some estimate of their relation to the pottery originally produced and used. This latter enterprise lies beyond the scope of this study.

There are two central concepts relating to measuring different features of observed items: *reliability* and *validity*. Reliability means that the measurements are correct: accurate and constant. If (when) there are errors in the measurement, they are not biased systematically and therefore sum up to zero and vary in a random way. This is a prerequisite for the effect that the counted values for statistics like means or standard deviations can still be correct, even though there are some errors in the data (which is usually inevitable). Validity means that the measured feature is really indicative of the phenomenon of interest. The validity always relates to knowledge of the phenomenon studied and needs to be assessed by criteria arising from the subject matter.

Figure 2.6 presents a model of factors, attributes, and their measurements. The *factors* (on the left of the diagram) are the main influents for the different features (attributes) of the pottery. The arrows indicate the assumption of which features have the strongest influence. I have considered here four factors: the date, the vessel type, the external contacts, and the properties of the clay and firing technique. The external contacts are dependent on the date, but were considered separately as they do not seem to affect all the vessel types: e.g. bowls, kraters, and small containers seem more prone to bear signs of contact, while the vessels for cooking and storing seem to be more resistant to cultural influences (Yasur-Landau 2010: 9–33; 227–266). The properties of the clay and firing technique were supposed to be rather constant during the short period of the Early Iron Age. The key to separating the effect of the date is keeping the other factors constant. A second step is to define the effect of the vessel type. It is clear that the function is closely related to all the features of the vessels measured. The type of the vessel is initially concluded from a sum of these features, and it should not be a problem to reconstruct the degree of this effect. The remaining differences would account for the difference in time. The "noise" effect of random variance, and some other factors unknown to us, would still remain. The external measure for the dating is provided by local stratigraphies. The results of the factor analyses (see chapter 5.3) is congruent with the idea that at least the color variables co-vary (presenting the properties of clay and firing), as well as the different thickness measurements related to rim form (related to vessel type and date).

There are two kinds of error. The first is an error in sampling, which can be estimated using confidence intervals. The second kind of error is an error of measurement, which will follow from the process of changing observed features into attributes of variables, i.e. into numbers denoting the attributes. There is an error effect (ε) in all variables, but their amount and risk of being systematic vary. For the measurements of size (ratio scale), one can suppose that the error is unsystematic, normally distributed, and sums to zero. In the variables of nominal scale (classes), the errors of measurement are actually false classifications. As all classifications of archaeological materials are modern constructions, and there is no inherent and "true" classification, I mean by false classification a deviation from the definitions that I considered final after completing the sorting process. There is a risk of systematic error in classificatory variables, relating to their frequencies. While some vessel types are more common than others, it may happen, that in border-line cases one easily classifies an object as the more common type instead of a rare one. This leads to an over-representation of those types. This relates to the nature and definition of types. The differences between the variability and conformity of different types of vessels, and the clarity of their boundaries, might reflect the nature of the material. The errors in group memberships are difficult to evaluate because of the heuristic nature of all grouping methods. If some rules are explicated, the departures of these rules can be considered classification errors. There might be systematic tendencies towards the center in the ordinal scaled variables, such as hardness and the amount of tempering materials. In these cases, no mechanical measurements have been used.

The assemblage of ceramics that were retrieved through an intensive strategy comprises ceramic material (mainly shards) from two areas of excavation (U & W). The material is collected in one data set, but can be split according to the areas when, for example, features between different local strata should be compared. The shards were also ascribed to a vessel type, with the background suppositions of the full vessel forms defined with the help of material excavated earlier at the same site (1994–2001) and typological literature (e.g. Amiran 1969, and several excavation reports). The assumption about the full form of the vessel of a preserved rim fragment does not affect the measurement of most variables, such as thicknesses or color. The analyses of this pottery material are presented in section 5.3. The material from non-intensively retrieved areas in the KRP (areas N, R and S) and Fritz's campaigns (1994–2001) at Tel Kinrot cannot be considered as a representative sample, and therefore I did not include this material in the statistical study. It is included in the typology of the pottery material, and in addition to its typological value it provides information about the layers the material has been collected from, and the date and function of these contexts – the approach prevailing in the excavation reports.

Typological pottery studies in Israel-Palestine are focused on the date and function of the vessels. However, there are other features in the ceramic material that can have archaeological significance. For example, some contexts include more worn fragments, and this can be useful information for interpreting the formation of the context. Worn fragments can be a sign of erosion that has affected the material. If we also have worn pebbles in the same context and the shards are of several periods, interpretation as erosional accumulation seems likely, but if the material is packed below a floor and does not include pebbles, a constructional fill seems a better interpretation. Such information is not related to the typological work, but can be helpful in other respects, and is not available if only well-preserved vessels are studied.

Statistical modelling

An analytical model is a simplified representation of a complex reality. Creating a model enables the setting up of hypotheses and their testing against the archaeological data (Orton 2004). A central question with all modeling is how large are the discrepancies that will be allowed between the model and the data (representing the reality), so that the model can be considered both understandable and useful (e.g. Orton 2004; Doran & Hodson 1975). The most useful models are the simplest ones that include all relevant aspects of the studied phenomenon. Focused and restricted phenomena are more prone to successful modeling (Lake 2001: 725–727). Typologies could be considered a focused study that would benefit from statistical modeling (Doran & Hodson 1975: 159–86; Orton 2004). There is no single analytical model behind my use of quantitative devices. In archaeology, the defective nature of the data, the inaccessibility of many features of interest, and the gap between the material remains and the reality of human life poses challenges for quantitative studies. However, the same can be said of social or psychological studies, and yet insightful quantitative analyses are produced in those fields. The use of any model requires one to be explicit in the process of data analysis, and thus it helps to refine one's thinking. Our statistical question may be "What kind of differences are there between the different pottery assemblages at Tel Kinrot?" The interpretation of the differences then, is an archaeological or anthropological question. The differences may derive from changes in workmanship, reflected in clay preparation and style, or they may reflect innovations from contacts with other people in the region, or something else entirely. If the material seems to be uniform, we may explain it as due to the limited time sequence of the Early Iron Age habitation, or as reflecting a conservative potting tradition.

Archaeologists have used *cluster analysis* for classification (e.g. Kroeber 1940; Shennan 1997: 216–219). Cluster analysis is a family of grouping principles that either combines items with or divides them from each other through the use of measured variables (e.g. Shennan 1997: 216–260). Clustering has been mostly used in a hierarchical way, resulting in tree diagrams. Such clustering is convenient when the amount of things to classify and the included variables are not numerous. However, when the amount of classified items or included features grows, the dendrograms lose their ability to clarify connections. Another weakness in the hierarchical clustering is their linear nature, with information proceeding in one direction. The method may even hide similarities between groups, such as similar rim forms in different vessel categories. I have thus preferred *discriminant analysis,* which requires the analyst to set the number of groups beforehand. As my purpose is to evaluate the typological classifications, I can use the number of classes and types and see how well the statistically defined groups associate with the types. *Factor analysis* (FA) is a descriptive multivariate method, used to trace features that co-vary and can be interpreted as reflecting some background factor like technical facilities, preparation of clay, or the common function of a vessel group. A great number of attributes can be reduced to a few factors in order to help interpretation. Another method that helps to reveal patterning over variables is *correspondence analysis* (CA). It is a heuristic devise that makes it easier to "see" different features in a map-like picture, and to discover features that form patterns with each other.

Factors	Variables	Level of Measurement	Measurement error
The factors lying underneath and affecting the material.	Variables that are affected by the factors and are measured.	How the variables are measured: level of measurement limits the possible analyses.	It is assumed that the error of measurement sums to zero and they are normally distributed.

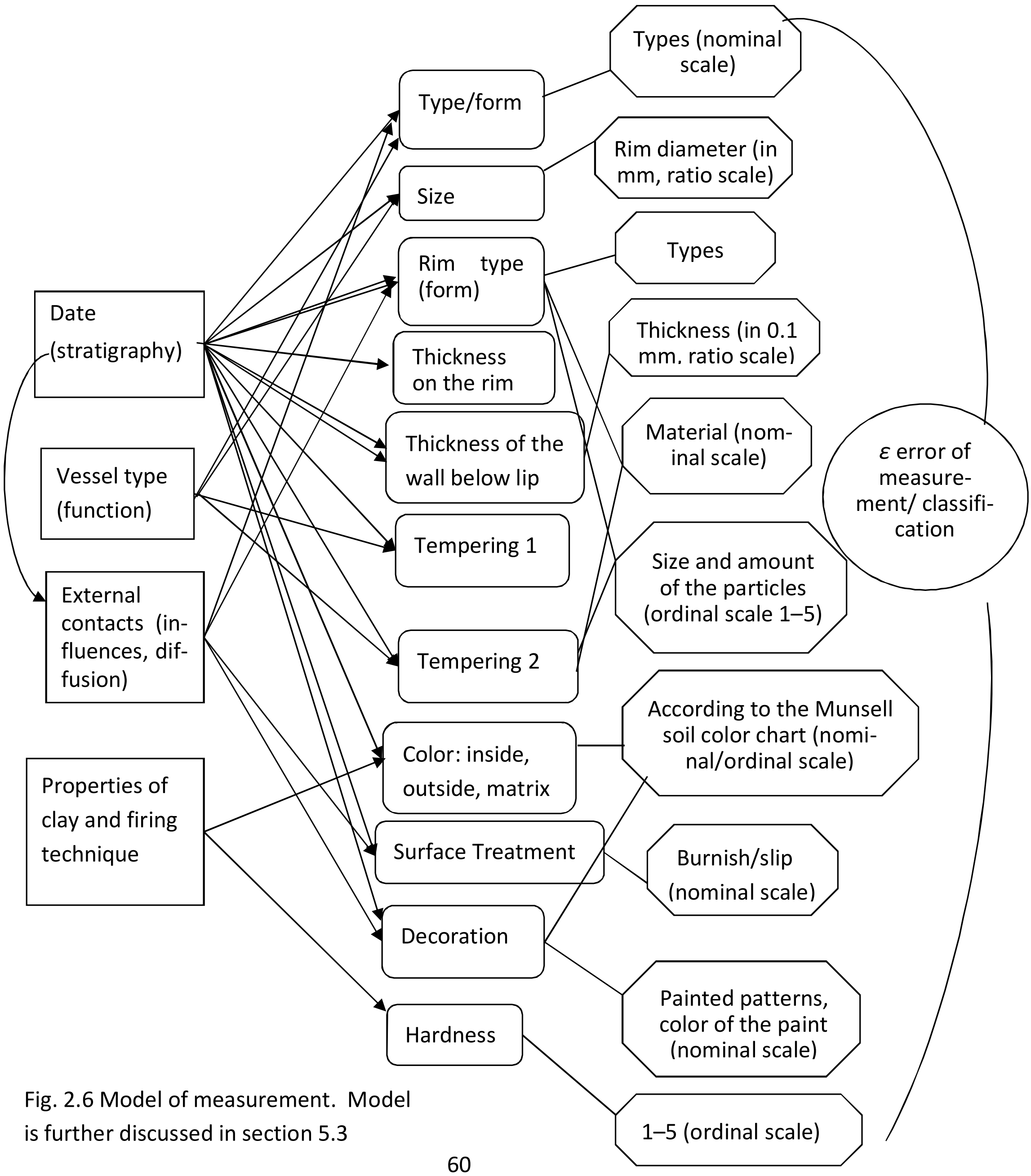


Fig. 2.6 Model of measurement. Model is further discussed in section 5.3

Chapter 3 Tel Kinrot: the Site

3.1 Nature of the Site: Natural Formation Processes

Location and Topography of the Site

Tel Kinrot *(*Arabic *Tell el-'Orēme*) is situated at the north-western side of the Sea of Galilee (Figs 1.1, 3.3; Appendix 1; 252859.200791 Palestine Grid). The area of the tell is about 10 hectares, and according to surface surveys it has signs of Early Iron Age activities throughout the area (Stepanski 1999; 2000). In the Early Iron Age Tel Kinrot was a large urban site. Its location along an ancient trade route from Egypt to Mesopotamia, the *Via Maris,* undoubtedly affected the growth of the settlement. Cities like Megiddo, Hazor, and Damascos have flourished along this route, especially during the Bronze Age and Iron Age II (Pakkala et al. 2004: 6–8). The urban nature of the site can be inferred from the size of the settlement, the town planning apparent in street and drainage systems, the use of defensive structures such as the earlier city-wall, and the presence of imported wares attesting to trade networks of trans-local scale (Münger et al. 2011: 77; for definition of 'urban,' Cowgill 2004: 526–529). The subsequent habitation phases have formed an artificial mound, a *tell,* upon a natural limestone hill (Köppel 1932: 300–301). On its southern side are the fertile plains of Ginnosar (Arabic *El-Guweir*), to the east the hill slopes towards the Sea of Galilee, and to the north and west the terrain is hilly. The south side of the mound has a very steep slope (figs 3.1–2). The slopes on the east and north sides are shorter, and the slope on the west side is rather gentle until it turns steep when closer to the lake. There are water resources aplenty, as in addition to the lake there are several springs at the foot of the tell (Pakkala et al. 2004: 6). The contour lines vary considerably on the slopes. The shore line itself is narrow, and the natural fluctuation of the sea level had dictated that the settlement be set higher on the hill. Similar phenomena appear around the sea coast in its northern parts (Maier 2010: 19). Along with the water and lacustrine resources for subsistence, the sea has also provided means of transportation.

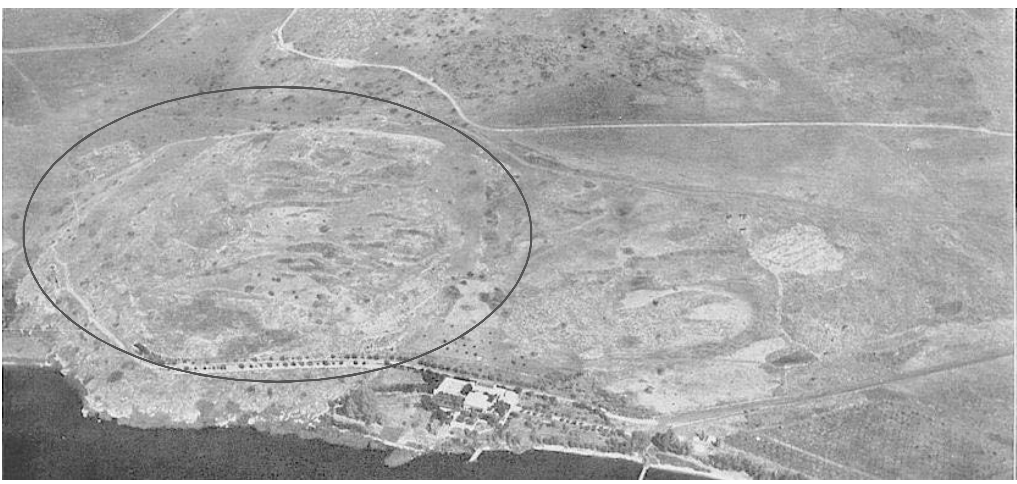


Fig. 3.1. Aerial photograph from 1918, © Bayerisches Staatsarchiv (Dalman 1925). Photo from the University of Tübingen Library. Tel Kinrot/*Tell el-'Orēme* is on the lower left, encircled.

Fig. 3.2. Aerial photograph from 2010, photographed by Skyview, © KRP. To the south.

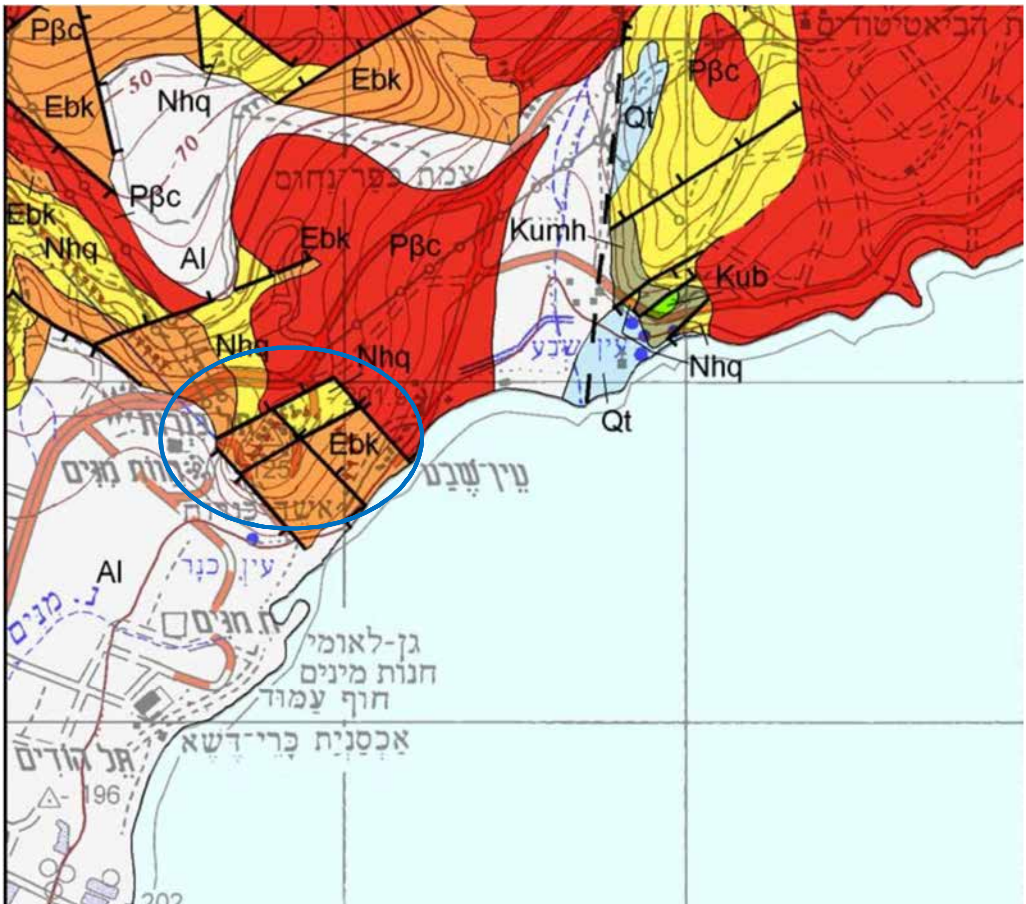


Fig.3.3 Geological map of Teverya, detail from Sneh 2008. Tel Kinrot circled. North is at the top of the drawing. For a full legend, see http://www.gsi.gov.il/_Uploads/ftp/GeologicalMap/EnglishSite/Teverya.html. Abbreviation Al refers to alluvial soils, Ebk to limestone formations, Nhq to conglomerates, and Pβc to cover basalt. Black solid lines indicate faults.

Geology and Topography of the surroundings

Early topographic surveys in Galilee were conducted by Edward Robinson (1838–1839), H.B. Tristram (1863–1864), the Palestine Exploration Fund (1887–1888), Gustav Dalman (1919), William Albright (1921), and Aapeli Saarisalo (1927). The studies of Robinson and Albright were focused on identification of biblical sites, reflecting an interest in biblical stories. Tristram paid close attention to landscapes and topographical and geological details, as did as Dalman and Saarisalo in later decades. They sometimes include descriptions of land use by the fellahin or Bedouins (Tristram 1866: 425, 433). However, their writings were also motivated by the relationship of the region with the biblical scriptures, and the ability of these landscapes to supply illustrations for the Bible (Tristram 1866: b-b2; see also Saarisalo 1924: 24).

The present topography of the Lower Galilee is characterized by the Jordan rift valley, the hill country on its western side and the Jezreel valley on the southern side of the hills of the Lower Galilee. The Jordan rift valley was formed during the Miocene age (23–5.3 million years ago[5]) and arrived at its present morphology towards the end of Pliocene (5.3–2.6 million years ago) and during the Pleistocene (2.6 million–11.7 thousand years ago). The valley is part of an over 6 500 km long fault extending from the Red Sea to Anatolia, running along the Arabian and African plates (Orni & Efrat 1966: 70–73). The width of the Jordan rift varies from between 5 and 25 kilometres. Traditionally, the Upper and Lower Galilee are divided by the deep gorge of the perennial stream *(wadi)* of Amud, running to the Sea of Galilee through the plain of Ginnosar (Orni & Efrat 1966: 63; Sneh 2008). According to this division, Tel Kinrot is located in the southernmost part of the Upper Galilee, as wadi Amud runs on its southern side (Sneh 2008). The height of the hill country in Lower Galilee is usually around 300 meters above the sea level, and the highest elevations are less than 600 meters above sea level, while the mountains in the Upper Galilee reach double such elevations (Orni & Efrat 1966: 63). Faulting and uplifting of tilted blocks characterize the present topography, especially of the Upper Galilee (Orni & Efrat 1966: 67). The local differences in landscape are strong (Saarisalo 1927: 13). Tel Kinrot is located in the valley south of the higher Upper Galilean hills. The mound is fully below the sea level of the Mediterranean, although it is accumulated upon a natural hill. The peak of the tell is measured at 125.00 meters below the sea level.

The geology of the Galilee and the Golan was mainly formed during the Neogene age, and consists of chalk, lime- and sandstone formations, and conglomerates that are covered by volcanic basalts. The Galilean hills were formed during the Miocene age, and are sedimentary carbonates including limestone, chalk, marl, and dolomite. In the Eastern parts of Galilee the hills are covered by later volcanic basalt plateaus (Raphael 1992: 966, 968–969). These basaltic plateaus are remains of the tectonic and volcanic activities that took place after the soft limestone and dolomite formations of the Upper Cretaceous Age were formed (Orni & Efrat 1966: 51, 64). There have been several waves in their formation (Tristram 1866: 435–436). The volcanic episodes that resulted in the basaltic covers in the Golan and in the Eastern Galilee took

[5] For the chronologies of the geological periods, see the International Chronostratigraphic chart: Cohen, Finney & Gibbard 2013.

place during the Pleistocene (Raphael 1992: 966). A map made by Gottlieb Schumacher in 1889 of the Tabgha shows basaltic hills rising on the north-western side of Tell el ʿOrēme. The hill itself is a limestone formation, and all the basalt stones now present on the hill have been brought from the hills on its northern side (Köppel 1932: 300). Schumacher already identified the tell as an area that should be excavated (Schumacher 1889). The chalk/limestone and basalt materials play a prominent role in ancient settlements as building material (Tristram 1865, Dalman 1921, Fritz 1985). In the Carmel region the chalk and limestone formations are interspersed with harder stones called silex by Tristram (1866: 112–113). The same holds for the limestone formations at Kinrot: they include chert (Sneh 2008). Local stone materials were also most likely used for clay temper.

There are also quaternary alluvial deposits, including clays around the Sea of Galilee (Sneh et al. 1998; Bogoh & Sneh 2008: Sneh 2008). The deposits on the plain of Ginnosar are local clay sources for Tel Kinrot, but there are also clay formations on the slope of the tell itself. There were clay beds exposed on the northern foot of the tell, behind the parking area of the modern German pilgrims' guesthouse Tabgha, that were observed by myself in October 2013 (Fig. 3.4). These exposed clays were close to the modern surface, below the dark humus-rich layer, and included an over twenty meters long strip, more than 2 meters thick. There was both white and red clay visible. It is evident that there were several clay sources available for the potters of ancient settlement.

The faults and tilting have created a fractured landscape, divided by valleys and gorges of differing sharpness between plateaus and peaks (Orni & Efrat 1966: 67). The landscape has also been exposed to the natural processes of erosion. The effects are both subtractive and additive in nature, depending on the topography and the vegetation. The erosive moving of land is caused both by wind (mainly in the dry season) and by water. As the rains are heavy showers they effectively move material, especially where the differences in altitude are strong, as is

Fig. 3.4 Exposed clay bed behind the parking lot of the German pilgrim's guest house. Photograph to the west by TT.

the case in the Jordan valley and its surrounding hills. A typical feature of the landscape is the forming of *wadis* by the winter rains, where the rain water runs in the winter but which are dry in the summer (Saarisalo 1927: 17–18). Around the Sea of Galilee there are alluvial soils formed by erosion from the hills above and the fluctuating water level of the sea and the river Jordan. The plain of Ginnosar on the southern side of Tel Kinrot is mainly composed of alluvial materials on limestone, chalk, and basalt, enriched with organic materials (Orni & Efrat 1966: 81; Maier 2010: 22). The ground is dark and fertile (Saarisalo 1927: 15–16; Raphael 1992: 966; Bogoch & Sneh 2008; Sneh 2008). The soils at the NW side of the Sea of Galilee are mainly terra rossas. On the basaltic rocks there are grumusols (alluvial clay) (Raphael 1992: 971).

The level of the Sea of Galilee in modern times has fluctuated around 208–209 meters below the sea level of the Mediterranean (Raphael 1992: 969; Saarisalo 1927: 13; Survey of Western Palestine 1881–1883). After a pumping station was built in 1964 on the southernmost part of the tell, the national use of water has most likely affected the level of the Sea of Galilee to some extent. There is a gap in the known level curve of the Sea of Galilee between 4000 and 2000 years BP, from the beginning of the Middle Bronze Age (ca. 2000 BCE) to the beginning of the Common Era. Like other gaps, this one can be correlated with a low standing level of the lake. This low stand between 4000 and 2000 BP has estimated to have been between 220 and 210 meters below sea level (Hazan et al. 2005: 71–72). Thus the difference between the modern low stand and the one during the Bronze and Iron Ages is several meters, which would have left more shoreline exposed below the steep lowermost part of the hill's eastern slope. Water resources are a vital element of land use and subsistence; in addition to precipitation, the settlers of Tel Kinrot had access to the lake and several springs at the foot of the mound.

Climate and vegetation

The climate in the Lake Kinneret region is of the Mediterranean type, marked by mild, rainy winters and hot, dry summers. The conditions are greatly affected by the latitude, the distance from the Mediterranean, and the topography (Baruch 1986; Frick 1992; Meadows 2005). The rainy season takes place between October and May, and most of the rainfall occurs between November and February (Orni & Efrat 1966: 114–116). The rainfall is greatly affected by the local topography, as the air ascending a slope cools and takes in humidity. The annual precipitation at the northern parts of the Sea of Galilee is around 500 mm (Frick 1992: 122). The precipitation decreases from north to south, from the 700 mm in the Hula basin to 400 mm over Lake Kinneret, and down to less than 300 mm in the Beth-Shean region south of the lake. Another drop in rain fall occurs in the west-east gradient, from the Upper Galilee to the Kinneret basin (Baruch 1986: 39). The valley around the Sea of Galilee, lying 200 meters below sea level, has a high barometric pressure and warm temperatures throughout the year. The air is compressed and warmed while descending into the valley, with its generally steep sides (Orni & Efrat 1966: 123).

Around the beginning of the Iron Age a shift from wetter to dryer climatic conditions took place in the Eastern Mediterranean (Schilman et al. 2002, 181). This dryer phase, taking place between 3100 and 2000 years BP, is attested by increased oxygen isotope ($\delta^{18}O$) values and low lake levels (Schilman et al. 187–188). It has been suggested, based on carbon isotope analysis ($^{13}C/^{12}C$), that the present arid climate regime started at this time (Magaritz et al. 1991: 455). Therefore, the modern temperatures and precipitations for Tiberias (9 km south of Tel Kinrot) can be regarded indicative of those during the Early Iron Age.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	total
Temperature (C°)	14	15	17	20	22	24	27	28	26	24	20	15	
Precipitation (mm)	130	95	60	15	4	0	0	0	2	18	80	130	534

Fig. 3.5 Average temperature and precipitation from 1960 to 2006 (http://weatherclimat.com/israel/ tiberias.html)

The natural vegetation of the Hula and Kinrot valleys during the Late Glacial period was dominated by oak forest, which decreased at the beginning of the Holocene (ca. 10 000 C^{14} years BP, uncalibrated) but recovered to some extent during the early Holocene (Baruch 1994: 110). Later in the Holocene (9000–6000 C^{14} yr BP, uncalibrated), covering the Neolithic and Chalcolithic periods in the Levant, arboreal pollen influx is still high but oak is partly replaced by pistachios, which indicates drier summers (Meadows 2005: 631). This period also shows a decline in the natural forests (especially of deciduous oak), which is probably mainly due to increased aridity (van Zeist et al. 2009). From the Neolithic on, there is also a growing impact from humans, seen both in the decline of the woodlands and in the rise of cultivated olive trees, cereal grasses, and weed plants. These phenomena reflect forest clearing, cultivation, settlement, and animal husbandry (Baruch 1994: 115–117; Yasuda et al. 2000: 131–132). According to pollen analyses from the Sea of Galilee, the region was still rather densely forested by oak during the Bronze Ages, while a continuous decrease in oaks started around 1700 BCE and continued until 550 AD. Between the 1700 BC and 350 AD, the olive is represented by relatively low but stable values and pistachio and pine by very low values. The decline of arboreal vegetation and rising values of ruderal weeds attest to an increased clearing of the forests for agriculture and/or pasture land during the period between 1700 BC and 350 AD (Baruch 1986: 41–45). According to Zeist et al., olive cultivation declined during the Middle and Late Bronze Ages and largely disappeared during the Iron Age in the Hula region (Zeist et al. 2013: 29), just 30 kilometres north of Tel Kinrot. A similar phenomenon has been attested at Birkat Ram in the Golan Heights (Schwab et al. 2004: 1727). This may indicate a real difference in local economies, reflecting the prosperity around the Sea of Galilee.

The analysed carbonized plant remains from the early Iron Age contexts at Tel Kinrot have yielded cultivated cereals (barley and wheat), pulses (bitter vetch and lentil), olives, grapes, and figs. The cultivated plants are grasses and shrubs (cereals, fig, and pulses), one liana, (the grape *vitis vinifera),* and a low growing tree, the olive *(olea europaea)*. Wild plants included low grasses like stinking mayweed, oat, meadow grasses, and clover (Klee & Kühn 2005: 5–10; 2003: 30–31; Klee 2011: 80–81). Stinking mayweed and grasses often accompany cultivation in its pre modern phases (Lovell et al. 2005: 112, 114). Clover and oat may have been used as fodder (Boonman 1993: 285, 300). The cultivated plants were locally produced, most likely in the neighbouring fields and villages (Klee 2011: 80). Fishing has been attested by fish bones, as well as hinted at by net weights from the site. However, the fish bones, especially those of the local species, are most likely under-represented because of their small size and fragility (Thomsen 2011: 79). The identified Nile perch also indicates imported fish (Ziegler & Boessneck 1990: 155; Münger et al. 2011: 79). The faunal remains attest to the herding of mainly sheep/goat (59 %) and cattle (33 %), while domestic pig was used in small amounts (2 %) only. The bone assemblage is dominated by complete skeletal remains of sheep/goat and cattle as adult animals and pigs at a young age. This indicates that milk and wool production were an important part of animal husbandry, while the pigs were kept for meat. The animals were slaughtered on-site. The inhabitants seem to have been self-subsistent as to their animal products (Bar-Oz 2011: 86).

Frequent mentions of olive groves and vineyards in biblical sources (legal, story-telling, historic, and prophetic texts alike) attest to a scenery that the generations during and after exile in the 6th century BCE were familiar with, where the main agricultural supplies included wheat, wine, and olive. This is in line with the clear increase in olive during the Persian and Hellenistic periods after a relative decrease in olive cultivation from the Middle Bronze Age to the Iron Age (Baruch 1986: 42; Zeist et al. 2009: 29). Flavius Josephus, a Jewish antique history-writer, depicts the region around the Sea of Galilee in his account of the Maccabean rebellion against Rome in Palestine, written 76-79 CE. About the country around the lake, he writes:

> Its nature is so wonderful as well as its beauty; its soil is so fruitful that all sorts of trees can grow upon it, and the inhabitants accordingly plant all sorts of trees there; for the temper of the air is so well mixed, that it agrees very well with those several sorts, particularly walnuts, which require the coldest air and flourish there in vast plenty; there are palm trees also, which grow best in hot air; fig trees also and olives grow near them, which yet require an air that is more temperate. One may call this place the ambition of nature, where it forces those plants that are naturally enemies to one another to agree together; - - - it supplies men with the principal fruits, with grapes and figs continually, during ten months of the year and the rest of the fruits as they become ripe together through the whole year; for besides the good air, it is also watered from a most fertile fountain. (*Bell Jud. III.10.8*, translated by Whiston 1999)

Josephus wants to convince the Roman aristocracy of the good nature of the Jews and their religion. This may affect his depiction of the Galilean nature, where "natural enemies agree together." However, his depictions should have been credible for people living in the region, and thus not very far from the actual conditions. The Hellenistic and Roman periods are characterized by an increase in olive, walnut, and wine in the pollen analyses (Baruch 1986: 41–46). In a travelogue of a pilgrimage from the late 4th century CE, Egeria describes Heptapegon (modern Tabgha) as an area with springs flowing uninterrupted, surrounded by green fields and many palm trees (quoted by Petrus Diaconus in 12th century CE in *de locis sanctis V.3*; for the dating and route of Egeria's journey, see Röwekamp 1995: 21–24, 30–34). However, the devotional character of the travelogue may override exactness of depiction.

When archaeological activities started in the beginning of the 20th century, the landscape was largely deforested, but other greens were plentiful (Dalman 1911: 111–113). A travelogue from the Spring of 1911, written by the Finnish professor of the Old Testament Arthur Hjelt, describes the region of Lower Galilee (when entering the district from south-east) as a thicket with bushes and small trees (oaks, maples, sycamores, etc.), in a contrast to the harsh Judean landscape (Hjelt 1917: 59). The hills around the Sea of Galilee are depicted as bare from trees but not barren, the north-western seashore growing some palms and the shoreline having bushes of oleander and thorn (Hjelt 1917: 70). Slightly earlier, Tristram (1886) described the scenery as barren and empty of all green except during the short rainy season.

The present-day western lakeshore can be described as a Mediterranean savanoid vegetation zone, dominated by *Ziziphus loti* (a deciduous shrub in the buckthorn family *Rhamnacae*), associated with dwarf shrubs of the *Ballotalia* (black horehound) order (Baruch 1986: 39). In the beginning of the 20th century eucalyptus was brought to the land and introduced to the surroundings of the Sea of Galilee (Dalman 1911: 111). They grow on the close lake shore, and do not disturb the remains higher on the slope. Other planting activities have taken place after 1948. At the present, the plain of Ginnosar on the southern side of the tell is planted with tropical varieties like banana, mango, and date. The mound grows mainly grasses, shrubs, and some small trees. Tree roots are thus not a very strong element on the slope, but the terrain has been exposed to erosion. The mound has been used as pasture land for cows and donkeys in recent times. Animal burrows of hyrax, and probably other small mammals, have sometimes disturbed upper layers.

3.2 Settlement History

Human activities and habitation at Tel Kinrot have taken place during several periods starting from the Neolithic and Chalcolithic periods, which are only attested by a few finds from later contexts, leaving the extent of these earliest activities unknown (Winn & Yakar 1984: 22–23, 42; Münger 2013: 149). Large scale settlement at Tel Kinrot began during Early Bronze Age I and continued until Early Bronze Age II, or the beginning of EB III. Early Bronze Age remains have been excavated by Winn & Yakar in 1982, when three phases of occupation were identified (Winn & Yakar 1982: 23–24). Area R of the Fritz and KRP excavations has revealed architecture dating to the Early Bronze Age in at least two strata, however the limited exposure hampers interpretation. Ceramic fragments from the Early Bronze Age are commonly found in later deposits from all excavation areas, attesting to a habitation covering large areas on the mound. Stratified structures with associated artefacts dated to Early Bronze Age II–III were found on the upper mound (Fritz 1990: 19–24). It seems that during Early Bronze Age III and the Intermediate Bronze Age there was a gap in settlement (Winn & Yakar 1982: 26, 44; Fritz & Münger 2002: 8; Pakkala et al. 2004: 13; Münger et al. 2011: 74).

A massive city with a partial glacis (a steep, multilayered rampart) was excavated by Fritz in the 1990's, and its construction was dated to Middle Bronze Age II according to associated pottery finds. The total width of the earliest defensive wall of the Middle Bronze Age is unknown, because it lies partly below the later city walls of the Late Bronze Age (in area G) and Early Iron Age (in area H) built above it, using it as their foundation and covering its inner edge. For this reason the relation of the city wall to the domestic architecture inside the walls has remained unclear. The overlying Late Bronze Age wall was 10.5 meters wide (Fritz & Münger 2002: 8–10, 26; Pakkala et al. 2004: 13–15), and the wall of the Iron Age reached a thickness of 12 meters at some points (Münger 1999: 18). The earlier wall was probably of a similar size, in order to have served as a foundation for the later walls. There are traces of habitation phases from Middle Bronze Age II, but the picture is fragmentary (Münger et al 2011: 74). The most substantial remains attributed to this period in the domestic areas within the city are from area H: one paved floor and several plastered floors were connected with walls, and the building can be interpreted as remains of a domestic house (Münger 1999: 18; Fritz & Münger 2002: 10). Some remains of the MB II period have also been exposed in area Q (Pakkala et al. 2004: 15). In area R, as well adjacent to the city wall, there was a series of white plaster floors, exposed in a limited area and damaged by later building activities (Pakkala et al. 2004: 13–16; Zangenberg et al. 2005: 188). In addition, scattered finds from the salvage works related to recent local construction have been typologically dated to the Middle Bronze Age (Winn & Yakar 1982: 44; Stepansky 1999).

The evidence concerning the settlement of the Late Bronze Age is controversial. Two phases of habitation during the Late Bronze Age were identified by Winn & Yakar (1982: 23–26), and 80 ceramic artefacts and 101 stone tools were identified typologically as dating to the Late Bronze Age from a fairly restricted excavation area (Winn & Yakar 1982: 36, 40–41). However, the Late Bronze Age material was not illustrated in the article, and therefore it is difficult to evaluate the dating given by Winn and Yakar. The Late Bronze Age ceramic finds from the Fritz excavations on the slope were found in construction fills of the Iron Age habitation. These ceramics were dated typologically to Late Bronze Age I, and thus a gap in the settlement during Late Bronze Age II has been suggested. The suggestion is reinforced by the stratigraphic element of a light gray earth layer with Late Bronze Age pottery fragments that has been identified in most areas excavated on the slope. This element separates the Iron Age buildings from the Bronze Age layers (Fritz & Münger 2002: 11, especially footnote 15). Such a layer may be interpreted as erosional earth accumulated during a hiatus in permanent settlement.

There are artefacts that could be dated to the Late Bronze Age–Early Iron Age transition, indicating a continuation of Late Bronze Age traditions into the Early Iron Age (Stepanski 1999; Fritz 1999:106; section 5.2 below). There is no evidence for direct continuity from Late Bronze Age I to the Early Iron Age at Tel Kinrot. However, the material culture of the Iron Age habitation at the site continued in general the urban traditions of the southern Levant (Münger et al. 2009: 1–2; Münger 2011: 235), and the possibility of a small settlement or sporadic activities on the tell during Late Bronze Age II is not excluded. It is noteworthy that the Iron Age I inhabitants reused the defensive structures from the Middle Bronze Age II–Late Bronze Age I settlement (Fritz & Münger 2002: 9, 12; Münger et al. 2011: 75; Münger 2013: 151). These remains were probably visible on the surface during the foundation of the Iron Age settlement. Their re-use indicates that the boundaries of the Iron Age city were consistent with those of the Middle and Late Bronze Age settlement. According to Münger, the changes within the city walls, in the built-up area, were more dramatic (Münger 2013: 151). However, the remains earlier than the Iron Age have been excavated only to a very limited extent.

The most extensively investigated and published settlement is that of the Iron Age I–Iron Age II period. The Iron Age settlement phases were first divided into three strata, VI–IV, by Fritz (Fritz 1999: 94, 99–100; Fritz & Münger 2002). The date of the Foundation Phase was not established at that point. However, the similarity of the pottery assemblages between the two first strata of the Iron Age was clear from the outset (Fritz 1999: 94). Since 2005, the initial division into three strata has been modified. The Iron Age habitation includes several phases with many local alterations. These building activities and newly set floors do not necessarily take place at the same time in different buildings, far less in separate excavation areas. A division into clear cut strata throughout the excavation areas is considered unlikely (Münger 2005: 77, 88; Münger et al. 2011: 82). The settlement is still divided into three main phases: the Foundation Phase (former str. VI); the Main Iron I Horizon (str. V), and the Post-destruction habitation (str. IV). Especially the Main Iron I Horizon can be further divided into several subphases differing from one area to another. The Post-destruction phase may also exhibit two phases in some areas (Alanne & Valkama 2004; Saarelainen 2008; Münger et al. 2009: 2).

The settlement of the Foundation Phase was already well planned, as attested by the terracing of the slope and the orthogonal crossing streets accompanied by a drainage system (Fritz & Münger 2002: 14; Münger 2013: 151). The architecture so far recovered from the Early Iron Age has been mainly domestic, but they also include workshops: a courtyard with an olive press, traces of cereal processing, and installations indicating some small scale industry requiring small pools for liquids (Valkama 2005; 2007; van der Enden 2007; Klee 2011; Münger 2013: 153). Some of the domestic buildings are large (Fritz & Münger 2002: 14–16; Münger et al. 2011: 77–78; Münger 2013: 153). In addition, a building with a large walled courtyard and two small rooms has been interpreted as a communal space, probably of cultic use (Nissinen & Münger 2009; Münger et al. 2011: 79).

The Destruction of the Early Iron Age settlement

The settlement layers on the slope have yielded plenty of restorable pottery from inside the structures. It seems plausible that the destruction took place unexpectedly and quickly, so that the fallen structures largely sealed the movable goods inside the houses. Human victims of this disaster were found buried in the ruins, attesting to the abrupt nature of the destruction (Busch & Sasse 1998). The rich finds, together with the well-preserved architecture and the absence of signs of extensive fire indicates a sudden, though not necessarily military destruction of the Iron Age settlement (Münger 1999: 19).

It has been suggested that the reason for the destruction of the city was an earthquake, for both the first Early Iron Age settlement phase and the second Iron Age phase (the main horizon) (Knauf 1998; Dietrich & Münger 2001: 50; Knauf 2002: 22–23; Nissinen & Münger 2009: 131; Münger et al. 2011: 83). Because the site is located in an area of tectonic activity, this interpretation is probable (Schiffer 1985: 233). In Israel, the latest earthquakes damaging modest modern structures took place in 2004 and 2008, with serious devastating ones in 1995 and 1996. After the turn of the Common Era there are constant references to earthquakes inflicting severe damage in the region (Amiran et al. 1994: 265–286). For the first founding phase of the Iron Age city the suggestion remains uncertain at best, as the phase is less excavated and the evidence is thus scarce. The remains of unbaked but burned bricks, and the reddish earth layer resulting from the disintegration of the bricks connected to the destruction of the first Iron Age city, point to a fire. The amount of pottery sealed in this phase has been estimated as large in area K, where signs of fire were also identified (Fritz & Münger 2002: footnote 19). Information in the preliminary report (Fritz & Vieweger 1996: 7) and the field report (Busch & Sasse 1998) remains somewhat ambiguous. It seems that the features Knauf refers to as evidence for the destruction of the first Iron Age city actually concern the remains of the main phase of the Early Iron Age layers.

For the main phase, the evidence for an earthquake is convincing. Signs of fire have been recognized in area S, where the (phase S2b) bricks of walls W1730 and/or W6117 have fallen towards the west, i.e. the upper slope, covering pottery and working stones (Saarelainen 2007: 40). Similarly, in area R there were walls fallen uphill, and the large stones (even 80 cm wide) of the collapsed walls had cracked (Holmqvist et al. 2003: 23). In area K, there were as well traces of strong local fires and fallen walls that had sealed considerable amounts of pottery on the floors. In addition, there were two instances of human remains found beneath the destruction material. One included remains of three infants (6, 10, and 18 months old) and the other included crania of two adults, one male (40–45 years old) and one female. There were few small finds in the same context with the infants, and the interpretation as accidentally buried children as opposed to intentional burial remains uncertain. The adults were clearly not a part of an intentional burial (Busch & Sasse forthcoming). Local fires often accompany earthquakes, and the walls falling up slope and stones cracking can already be considered strong evidence. It has been suggested that stratum VIA in Megiddo was destroyed by an earthquake (Marco et al. 2006: 572). The stratum is most likely of same date with the main phase of Iron Age I at Kinneret (Pakkala et al. 2004: 19), though it may have begun slightly earlier, according to pottery comparisons (Münger et al. 2009: 2–3).

The fierce and unexpected destruction of the main phase of the Early Iron Age city created a massive layer of earth on the floors of these occupation layers. The earth material has protected the floor assemblages from later activities. This was not the case for the last layer of occupation during the Early Iron Age. In several areas a later sub-phase could be identified that reused structures built in the beginning of the main phase (K5A[6] in area K, U3A in area U, and S2A in area S). These remains were probably abandoned in a slower process, and the structures have largely eroded. The same goes for later structures that have been sporadically

[6] The sub-phases in area K were labeled KVA versus KVB in preliminary reports. Roman numbers are used for strata identified over the whole excavated field, and avoided here for the sub-phasing of separate areas.

recognized in several areas, like K (IV) and U (U2). In area W this later phase of the Early Iron Age was well preserved, as it was protected by a terracing wall.

Remains of later periods and effect of erosion

The slope seems to have been abandoned after the settlement of the Early Iron Age – beginning of Iron Age II. During the latest phases of the Iron Age, in the 8th to 7th centuries, the permanent habitation did not extend beyond the hill top, but was concentrated in and around a small but massively fortified stronghold, except for an isolated building in area Q that has not been precisely dated (Pakkala et al. 2004: 24–25). In the latest phases of the settlement on the hill top there was a large, presumably Assyrian Building found close to the modern surface. It was probably built in the 7th or 6th century BCE, but as it was found devoid of finds the time of its use remains open (Fritz 1990: 99; 102). Some sporadic settlement and/or activities took place in the Hellenistic, Roman, and Late Byzantine to Early Umayyad periods. An isolated structure interpreted as a farmstead at the southeastern outskirts of the upper mound was excavated in the 1980's and dated to the Hellenistic period (Fritz 1990: 103; 109; Pakkala et al. 2004: 26–27). A plastered channel was constructed along the foot of the tell, probably during the Umayyad period, and is probably linked to the palace of Khirbet el-Minye on the southern side of the mound (Pakkala et al. 2004: 27). Scattered surface finds and pottery found from a cave in area L in the mid-slope indicate that activities also took place during later Islamic periods. In addition, a road was cut along the eastern slope, probably during this period as well. Remains of farm structures have been identified, visible on the surface close to the excavation areas (A, G, and Q) along the northern part of the ancient city wall (Pakkala et al. 2004: 28). Erosional deposits below the topsoil on the slope often include pottery shards of Hellenistic and Roman common wares in addition to wares of Early Bronze Age and Iron Age, together with loose earth and small worn stones (Pakkala et al. 2004: 27).

The slope has been exposed to strong erosion after the settlement was abandoned. The impact of erosion varies greatly in accordance to the topography of the slope (for contour lines, see appendices 1 and 3A). At some points there are terracing walls preserved to a considerable height, or the bedrock rises steeply and protects the area immediately below. As the vegetation mainly includes grasses and small shrubs, they hardly contribute any protection against erosion. Area W was partly protected by a massive terrace structure. In contrast, structures in areas U, K, and N have largely been eroded and partly destroyed by later activities, such as the robbing of large stones.

Erosion on one hand sweeps away structures and materials, and on the other hand transports materials from uphill. The former function abrades connections between the remains that have survived. The difficulty in connecting the structures with each other is partly due to their location on the slope. Terraces were used in construction, resulting in considerable differences in the height of structures even of the same construction. The latter, piling effect of erosion transported small stones, earth, and material of a later date. This colluvial earth layer formed by erosion is often recognized below the dark, humus rich topsoil, and above the remains of the Early Iron Age. Sometimes a colluvial earth layer can be discerned between cultural layers.

In the colluviums directly below the topsoil, and in the topsoil itself, the pottery material is worn and mixed in nature, though the Early Iron Age is a dominant period. There is a marked amount of shards that date to Iron Age II, and small shards that have been identified as Roman or later. Assyrian pottery has not been identified, but an Assyrian style cosmetic palette of limestone was found in the topsoil from area U (Alanne & Valkama 2004: 4).

There has been more or less constant agricultural land use at the site and its vicinity. There are massive terracing structures on the slopes, probably relating to agricultural activities. They are difficult to date. They might have been used for olive or wine groves. Ploughing seems unlikely, because of the sloping topography (see App. 1 and 3B). Herding has taken place in the area until recent times, and the area is still used by local herdsmen (Fig. 3.6). A guest house of the German Association of the Holy Land (Deutsche Verein vom heiligen Lande) was built in 1890's on the eastern foot of the mound (see Fig. 3.1 and App. 3A). A road has been built on the north-western side of the mound, cutting the western slope. The road is nowadays part of highway 90, but parts of it are older. A national water pumping station was built on the southern part of the mound, and at its foot in the early 1960's (Mekorot 2015; App. 3B).

Fig.3.6 Cows grazing on the western side of road 90. Photo to the west, by TT.

3.3 The Research History of Kinneret

Early literary sources and identification

The earliest known mention of Kinneret in ancient sources is together with other major cities of the region like Hazor and Laish, in the list of Palestinian cities subjugated by Thutmosis III (1479–1426 BCE.) The list is inscribed in the Temple of Karnak in Upper Egypt (Simons 1937: 111, 116, line 34). A slightly later mention is in Papyrus fragment Petersburg 1116A*, which lists envoys from Kinneret among Canaanite honoraries. The papyrus is from the time of Thutmosis III or Amenophis II (1426–1400 BCE) (Epstein 1953). These mentions, as well as a fragment of an Egyptian stela found on the surface at Tel Kinrot, date to the 18th Egyptian dynasty. The stela describes the triumph of a pharaoh over the Mitanni, a Mesopotamian kingdom from the period 1600 to 1330 BCE (Albright & Rowe 1928). The linguistics and content imply that the pharaoh should be identified as Thutmosis III. The excavations have uncovered many ceramic items from the MBII-LBI periods in later contexts. This time would tally with the reign of Thutmosis III. It seems that the ancient name of the site was Kinneret already long before it was mentioned in the Hebrew Bible (Pakkala et al. 2004: 10). In the sources that date to the Late Bronze Age, such as the Amarna letters and the texts of Ugarit, the place name Kinneret does not appear (Fritz 1990: 176–178).

Biblical Sources

The proper noun Kinneret is mentioned seven times in the Hebrew Bible, with slightly different vocalizations (כִּנֶּ֫רֶת; כִּנָּ֫רֶת). The readings in the Septuagint have phonetic alterations (Χεζραθ in 1.Kings 15:20; Χεναρα in Num 34:11; Κενερωθ in Josh. 11:2, 12:3 and 39:35). In two of these cases the name is denoting a city or a political entity (Jos 11:2 and 19:35). More often, it refers to the Sea of Galilee (Num 34:11, Jos 12:3 and 13:27) and/or to the surroundings of the city and the lake (Dt 3:17 and I Kings 15:20). The reference in Jos 11:2 is somewhat unclear, as there are different kinds of political entities, kings, cities, and areas in the same context. Kinrot may therefore refer to a region or a city. From all the biblical passages it is clear, however, that Kinneret is a place (city, region, or lake) situated in the northern part of the Jordan Valley.

The list of fortified towns allotted to the tribe of Naphtali in Jos 19:32–39 is the most interesting of the biblical references, wherein Kinneret appears in a list of places in the region:

32 לִבְנֵי נַפְתָּלִי יָצָא הַגּוֹרָל הַשִּׁשִּׁי לִבְנֵי נַפְתָּלִי לְמִשְׁפְּחֹתָם׃ 33 וַיְהִי גְבוּלָם מֵחֵלֶף מֵאֵלוֹן
בְּצַעֲנַנִּים וַאֲדָמִי הַנֶּקֶב וְיַבְנְאֵל עַד־לַקּוּם וַיְהִי תֹצְאֹתָיו הַיַּרְדֵּן׃ 34 וְשָׁב הַגְּבוּל יָמָּה אַזְנוֹת תָּבוֹר
וְיָצָא מִשָּׁם חוּקֹקָה וּפָגַע בִּזְבֻלוּן מִנֶּגֶב וּבְאָשֵׁר פָּגַע מִיָּם וּבִיהוּדָה הַיַּרְדֵּן מִזְרַח הַשָּׁמֶשׁ׃ 35
וְעָרֵי מִבְצָר הַצִּדִּים צֵר וְחַמַּת רַקַּת וְכִנֶּרֶת׃ 36 וַאֲדָמָה וְהָרָמָה וְחָצוֹר׃ 37 וְקֶדֶשׁ וְאֶדְרֶעִי וְעֵין
חָצוֹר׃ 38 וְיִרְאוֹן וּמִגְדַּל־אֵל חֳרֵם וּבֵית־עֲנָת וּבֵית שָׁמֶשׁ עָרִים תְּשַׁע־עֶשְׂרֵה וְחַצְרֵיהֶן׃ 39 זֹאת
נַחֲלַת מַטֵּה בְנֵי־נַפְתָּלִי לְמִשְׁפְּחֹתָם הֶעָרִים וְחַצְרֵיהֶן׃

32 The sixth lot came to the sons of Naphtali and their clans. 33 Their border goes from Helef, the oak in Za'annim, Adami-Nekeb, Jabniel and until Laqqūm and it ended at Jordan. 34 And the border takes a turn to the west to Aznoth-Tabor and it goes from there to Huqqoq and reaches (the border of) Zebulun on the South and Asher on the West and Judah on the Jordan, towards the East. 35 The fortified cities are: Ziddim, Zer (LXX: Tyre), Hammat, Raqqat and Kinneret, 36 Adama, Rama, Hazor, 37 Qedesh, Edrei and Ein-Hazor, 38 Jirʿōn, Migdal-El, Horem, Bet-Anath, Bet-Shemesh: nineteen cities with their villages. 39 This is/was the inheritance of the tribe of Naphtali and their clans, the cities and their villages.

The concluding passages in verses 38–39 state that there were 19 towns altogether, with their villages. The list of fortified cities mentions 16 cities, and the places mentioned before the list include six or seven names, some of which may be other known place-markers than towns. When translating the geographical lists it is sometimes hard to know if a word is more likely to be a description or a proper name. The readings of the Greek translation of the Septuagint include ten names, as the noun for oak (eljōn) has been read as a proper place name, and it is transliterated, not translated. According to the places that have been identified, it seems that these places on the Western side of Jordan are listed from south to north.

I Kings 15.20 includes Kinneret in the list of cities and areas that were taken from the Israelites by the Aramean king of Damascus, Ben Hadad. Here Kinneret appears after three cities (Ijon, Dan, and Abel-Bet Macah) and refers to a larger area: all (the land) of Kinneret (kål-kinnĕrôt), before summarizing the conquest of Ben Hadad as encompassing all the land of the Naphtali (וַיַּךְ אֶת־עִיּוֹן וְאֶת־דָּן וְאֵת אָבֵל בֵּית־מַעֲכָה וְאֵת כָּל־כִּנְרוֹת עַל כָּל־אֶרֶץ נַפְתָּלִי).

All the Biblical mentions of Kinneret as a political entity would refer to the habitation of Iron Age II, still remembered generations after, or perhaps based on some earlier sources. The geographic descriptions that include Kinneret are now a part of Deuteronomistic history-writings, an extensive and lengthily processed collection of writings that theologically interpreted the rise and fall of the Israelite and Judahite Kingdoms. The work includes layers of different age and theological emphasis. The geographical lists in Joshua 13–19 are usually thought to be based on earlier sources that had their original *Sitz im Leben* in the administration of the monarchies of Israel and Judah in the 9th and 8th centuries BCE, and in the case of Judah also in the 7th century (Noth 1953: 8, 13–15; Fritz 1994: 196; Römer 2005: 82; Knauf 2008: 167; Wazana 2013). The lists might also relate to the Assyrian administration during the 8th century BC (Fritz 1996: 36). The earliest parts of the Deuteronomistic history writings are dated to the sixth century BCE (Smend 1978: 111–115; Römer 2005: 67), and the present forms in Greek and Hebrew are considerably later (Römer 2005: 165–169).

The geographical lists of the Hebrew Bible have often been interpreted as administrative lists. This seems to include an idea of a non-theological, and thus more purely historical, nature. Sometimes even a pre-monarchic kernel is suggested (Hess 1994: 191–195, 205). This is in contrast with the critical eye shed upon the conquest stories that have been recognized as theological and ideological writings rather than factual reports (Hoffmeier 1994: 165–166; Wazana 2013). The political interest in the lists was first suggested in 1982 by Nadav Na'aman, who dated them to the monarchy of King David (Hess 1994: 196). Their dependence on and cohesion with the conquest stories in Joshua 1–12 just preceding them was suggested by Moshe Weinfeld in 1986/1988. The lists have a nationalized goal, as do the conquest stories (Weinfeld 1988: 32; 1986: 283). Finkelstein and Silberman have suggested that a kernel of the Deuteronomistic writings, including the geographic lists, would have been written in the Kingdom of Judah after the collapse of the Kingdom of Israel in 723 BCE. The kernel would reflect the pan-Israelite expansive hopes of the Judahite king Josiah's politics (Finkelstein & Silberman 2001). The Deuteronomistic writers might also have created idealized lists in order to highlight the grandeur of the land that was given by YHWH to the people of Israel.

The name Kinneret does not appear in the later sources. In the 1 Maccabees, written around 100 BCE, the Sea of Galilee is called the water of Gennesar (11:67), and in the New Testament the rendering for the lake as the Sea of Gennesaret is another form of this name. The Arabic name of the mound in the 19th century was Tell Ḥanāzir (the mound of pigs), which may be related to the Greek name after an Arabic pronunciation (Hübner 1986: 256–258). The modern name *Tell el-ʿOrēme* (mound of ruins) avoids mention of the pigs, as they are unclean animals in both Muslim and Jewish traditions. The map of the Survey of Western Palestine already uses the name Khirbet el-Oreimeh (Sheet IV, surveyed in 1878). In modern Israel the lake as well as the mound bear the name Kinrot.

Identification

Internationally known early identifications of *Tell elʿOrēme* with ancient Kinneret were made by the German Gustav Dalman in 1919 (Dalman 1921: 118–120), and by the American William

Foxwell Albright in 1923, apparently independently of each other (Albright 1923: 36–37). The first scholar to identify the mound with the Kinneret mentioned in the Hebrew Bible was the German scholar Paul Karge, who was also the first to conduct archaeological activities at the site. The Finnish professor of the Old Testament Arthur Hjelt mentions in his travelogue from 1911 that professor Karge showed his visitors the excavations he had carried out at *el-Ureima*, and the finds that had been recovered. On the same occasion, he connected the site with the biblical Kinneret. The identification was published only in Finnish, in Hjelt's travelogue (Hjelt 1917: 95–96), but Dalman also refers to Karge (1921: 120). This identification has been accepted by scholars. Tell *elʿOrēme* is the only site in the geographical location given in the biblical passages that was also inhabited in both the Middle Bronze Age and in Iron Age II (Pakkala et al. 2006: 323–324; Fritz 1990: 2–3).

Small scale excavations

Tell elʿOrēme has been explored by several small-scale excavations. The first to conduct excavations at the site was Paul Karge in 1911 (published 1917). Silex artefacts were found during the first trial probes below the surface by Karge (Mader 1932: 299). In the 1930's there were several campaigns carried out by German scholars: Mader & Schneider in 1931–32 (published by Mader & Köppel 1932), and Bea in 1939 (published by Bea 1939 and Darsow 1940). After the World Wars there was a lengthy gap in investigations. In 1964 a water pumping station was built on the southeastern part of the mound, and rescue excavations were conducted at the site when disturbed archaeological remains were noticed by the field inspectors (Edelstein 1964). In the ensuing survey and excavation an aqueduct was found, which most likely dates to the Umayyad period. Three burials were also revealed, two of which were investigated and one was seen in section and left untouched. The deceased were placed in one or two pithoi each, and there were vessels typical for the Early Iron Age included in the pithoi along with the interred (Edelstein & Wolf, forthcoming.) Fragments of large pithoi, an intact flask, and small amount of bone material found during the construction work for the German Pilgrims' House at Tabgha indicate that there were further burials at the outskirts of the settlement (Stepanski 1999).

Large scale investigation at the site was begun by Dr. Professor Volkmar Fritz (1938–2007), who led a trial excavation on the upper hill in 1978 (Fritz 1978). The results were promising, and a project of large excavations took place in 1982–1985 (see below). The results were published in two preliminary reports (Fritz 1978; 1986), and the final report was published promptly (Fritz 1990). The excavations were located on the upper mound, and focused on the Iron Age II remains. At a few places structures of the Early Iron Age were fragmentarily exposed (Fritz 1990: 25–27). Shan Winn and Jak Yakar directed an excavation project from Tel Aviv University on the eastern slope in 1982. The excavations revealed finds and structures of the Early Bronze Age (Winn & Yakar 1984). During the 1990's there were several surveying and inspecting operations (including 35 short trial trenches) carried out by the Israel Antiquities Authority in the wake of construction activities for the Pilgrims' Guest House at the foot of the northeastern slope of the tell (Stepansky 1999).

3.4 Excavations in the 1980's, and the Published Pottery

This section presents the analysis of the pottery from the excavations of the 1980's. The goal of the dissertation is to clarify how the pottery retrieval method affects its analysis and the associated archaeological interpretations. This is done by comparing the different methods of retrieving and analyzing the material employed at Tel Kinrot. The 1980's project forms the background of Fritz's later work, and at present it is the latest published final report from the site. The pottery from the two projects on the slope (Fritz in 1994–2001 and KRP in 2003–2008) can be compared in detail, as the material derives from similar contexts. The "traditional" selective retrieval strategy presents well-preserved pottery vessels from stratified contexts. This strategy seems to be common for the 1980's and 1994–2001 campaigns, both directed Fritz. The intensive retrieval method (used within the KRP 2003–2008), keeping all rim shards and a selection of other ceramics, deviates from this tradition.

The fieldwork methods or retrieval strategy employed were not described in the excavation report of Kinneret (Fritz 1990), as is common for the excavation reports. The only details concerning the practical work that were reported include the Institutions involved and the fact that volunteer students worked as the excavating work force (Fritz 1990: 1–2). Therefore, the fieldwork cannot be analyzed from the evidence of the publication. The 1980´s assemblage is not included in the detailed comparison of the work with pottery at Tel Kinrot, as there are three features that set this assemblage apart from the excavations on the slope. First, the physical distance; second, the (partially public) nature of the excavated contexts, related to their place at the upper mound and in the vicinity of the gate. Third is the dating of the material mainly to the Iron Age II period. The contexts excavated on the slope from 1994–2001 and 2003–2008 are primarily domestic and date to the Early Iron Age.

The remains excavated in the 1980's were ascribed to six strata. The earliest stratum (VI) was dated to Iron Age I. It was identified in small excavation areas only. Strata V and IV were interpreted as a walled town of Iron Age II. Stratum III remains included only one building (Fritz 1990: 41–42). Strata II and I were the focus of the project. In addition to the remains that were stratified, a large Assyrian style building in area E (Fritz 1990: 99–102) and a Hellenistic building in area D (Rabe 1990: 103–108) were excavated. In the following paragraphs, I will focus on analyzing the contexts where pottery is discussed in any detail.

The role of pottery in the final report

The report of Kinneret I, along with its pottery presentation, stands in the culture-historical tradition of archaeology, the mainstream of archaeology in Israel-Palestine for the periods from the Middle or Late Bronze Age on. The pottery in the report (Fritz et al. 1990) is discussed without an explicit typology. Ceramics are described and illustrated as groups based on their morphological forms, but the groups are not explicitly defined, nor are all vessels ascribed to a group. Each phase includes a separate discussion of its pottery, written by the same person that describes the architectural remains or parts of them. The description of the pottery finds follows that of the architecture and serves as the dating evidence for the remains. Comparisons are made to single vessels or groups of vessels published mostly from Megiddo and Hazor, sometimes to other sites in Northern Israel-Palestine, and occasionally further afar (Fritz 1990: footnotes from pages 28, 38–40, 66–68). The cited parallels serve as the chronological anchoring for the settlement.

Pottery descriptions without explicit types are common in many excavation reports of the mid and late 20th century. These reports were used by Fritz, and they form the cultural niche of Kinneret I excavation report. A similar organization of the material as in Kinneret I (Fritz 1990) can be seen, for example, in the reports from Yadin's excavation at Hazor in 1955–58, where most references to parallels are to material excavated at the same site (Yadin 1958, 1960; Ben-Tor et al. 1989). In the series of Hazor reports, an explicit typology was first introduced by Bonfil for area A, stratum 8 (Bonfil 1989: 77–84). The Beer-Sheba I report integrates a short and list-like pottery description into the discussion of architectural remains and their interpretation (Aharoni 1973: 15; Herzog 1973: 25), with the exception of a chapter on seven kraters that were interpreted as related to the Philistine tradition (Bachi 1973: 38–42). In the second volume of the Beer-Sheba excavations (Herzog 1984), short notes on pottery were included in the discussion of the architectural structures, but the pottery was also discussed in a separate chapter, arranged according to strata. For each stratum, the discussion and plates followed morphological typology and the discussion ended with a chronological conclusion, given first in relative terms by indicating sites with similar materials and then in absolute terms in centuries BCE (Brandfon 1984: 37–69). In the report from the Tell Keisan excavations in 1971–1976 (Briend & Humbert 1980), a morphological discussion was placed after the description of structures from several strata that were dated to the Iron Age (strata 9–11). The report from the Tel Qiri excavations in 1975–1977 explicitly presented "only *important, i.e. chronologically significant types* and material coming from key loci" within the stratigraphic report (Ben-Tor & Portugali 1987: 65). The typological and quantitative study of the material appeared in a separate chapter that included analyses of differences in the vessel type frequencies in different strata at Tell Qiri and at nearby Yoqneʿam (Hunt 1987: 139–223).

The plates in Kinneret I (Fritz 1990) are organized according to areas and phases, inside which the arrangement of figures in the plates follows the morphology of the vessels, and thus vessels from the same loci are usually not illustrated together. It was the principle adopted by Yadin's editions of the Hazor reports (Yadin 1958, 1960 and 1969), Beer-Sheba (Aharoni 1973; Herzog 1984), and Tell Keisan (Briend & Humbert 1980). On the other hand, for the Oriental Institute excavations at Megiddo (Lamon & Shipton 1939; Loud 1948), the type-pots were organized only according to the strata. The type-pot presentation indicates that the same drawing was presented several times to indicate the presence of a comparable vessel, while differences were often noted in a description, such as "neck longer in proportion than drawing indicates" (Loud 1948: Pl. 73:12). The report from Tell el-Farah (North), on the other hand, presented the material according to vessel morphology alone, while the stratigraphic phases were only indicated in the vessel descriptions (Chambon 1984).

Remains attached to the stratigraphy: phase by phase

The excavations focused on two latest strata at the site that were excavated on a large scale. The description of these two strata in the report is lengthy, and also discusses the find material in detail at some points. The role of finds is mainly chronological. However, the finds were to some extent used to define the functions of spaces as well.

The latest remains found at two spots on the hill top were not ascribed to a stratum. An "Assyrian" Palace on the upper slope presented remains of a building close to the surface. The remains had suffered from erosion, and the ceramic finds presented Persian and Hellenistic shards, washed down the slope. The date of its construction was ascribed to the Assyrian or Babylonian dominion in the 7th and 6th centuries BCE, based on the reconstructed plan of the building. It was probably still used in Persian and Hellenistic times (Fritz 1990: 99–102). The Hellenistic building 646 and scattered walls in area D represent the last occupational use of the site. The dating of the remains stretches from the second half of the 3rd to the 2nd century BCE, based on two coins and pottery finds, though the pottery (Pl. 99:6–22) was not from sealed contexts or floors (Fritz 1990: 109).

Stratum I

Stratum I included remains of a citadel wall with a bastion or watch tower (built already in stratum II and re-used in stratum I) and a gate, domestic structures, and cisterns (Fig. 3.6). Another bastion of stratum II was re-used outside the citadel (Hübner 1990: 69–78; Rösel 1990: 85). Stratum I contained much material, both structures and artefacts, and it was divided into three phases and partially two sub-phases, all dated to the 8th century BCE under the Assyrian dominion (Fritz 1990: 83–90; 181). There are some contexts that include discussion of the ceramic finds. The pottery together with other finds is used to infer the nature of the structures, the social status of the occupants, and the dating of the architecture.

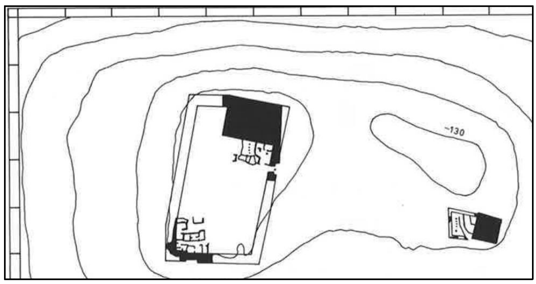


Fig.3.6 General plan of Stratum I (Fritz 1990: 9).

The description of house 928/936 next to the gate mentions special finds as one indication of a special function or the status of the occupant (Hübner 1990: 75). The houses in area B1 were interpreted as domestic buildings with the help of the scale of the structures, the presence of installations such as ovens, and the finds, which are not more closely defined (Hübner 1990: 82). Small finds are discussed as a possible indication of the social status of the inhabitants, as the larger houses close to the gate and the smaller ones further from the gate are compared. The explicitly considered finds include only special finds such as the lion bowl of Egyptian blue, a seal, ostraca, and an iron plough from the fewer but larger houses, compared with one scar-aboid and two cosmetic palettes from the smaller houses, which covered a larger area. Likewise, in Area A the finds discussed in the section on the fixed remains includes no ceramics, but only stone vessels, as their presence was considered indicative of the space as an open courtyard, as opposed to a roofed room (Rösel 1990: 86–87).

The discussion of pottery integrated with the interpretation of the structures in area B serves for the dating of the citadel to the time of the Assyrian dominion, and identifying the cultural background of the inhabitants as Israelite (Hübner 1990: 84; 91–98; Fritz 1990: 131–132). In area D, the excavated remains consisted of three walls and parts of a room. Here, the listed ceramic finds, together with some working stones, are used to indicate the two living phases of the room and their elevations (Fritz 1990: 87). The remains in area E2 were attributed to stratum II–I, as their stratigraphic position only assured their postdating of the stratum IV remains, and the pottery finds did not allow a more specific decision to be made between strata II and I, as the ceramics of these two strata were considered so similar (Fritz 1990: 91).

The pottery of stratum I was considered so homogeneous that it was discussed as one entity for all sub-phases, though in some cases a form was noted to occur only in phase IB (jar fragment Pl. 74:6) or IA (decanters). The description was written by Ulrich Hübner, who also described the majority of the architectural remains. The discussion focuses on the ceramics from area B that provided most of the material (245 illustrated items, 81 % of the illustrated items from stratum I). Pottery is discussed according to vessel groups and includes both grouped and individual descriptions. Pottery comparisons are drawn mainly from material published from Hazor, while other comparative materials are referred to selectively. The referred sites from further afield (Ashdod, Beth Zur, Samaria, Beth Shean, Gerar, and Amman) are used to provide comparisons for small containers (Hübner 1990: 91–98).

The bowls are described as groups of shallow bowls with carinated and rounded versions, flat platters, and deep bowls with carinated or rounded profiles. The flat bowls are mentioned as the most common bowls. The use of red slip and the occurrence of different lip forms are described separately, and the mentioned forms are given one or two examples in the plates. Two bowls with concave upper parts (Pl. 81: 5–6) are considered to indicate possible Assyrian influence. In general, bowls are characterized as being of the common variety of the Iron Age II period, and they are considered parallel to the bowls published from Hazor stratum VIII/VII–IV (Hübner 1990: 91–92). The kraters are considered as having mostly a carinated body, while some painted examples were described more rounded. Parallels for the carinated form are cited from Hazor strata VII–IV, and for the rounded form from Hazor stratum V. The discussion concentrates on surface treatments and decoration. A few features are described individually, as they are considered exceptional: one rim form, upright shoulder and horizontal handles (Hübner 1990: 92–93). The cooking pots are considered as one homogeneous group, all the vessels belonging to a type with a thick, rilled rim, handles, and a carinated body. The type is referred to as common in Hazor strata VII–IV. Four cooking pots are singled out as having "somewhat over-hanging lips common of the earlier cooking pots" (Hübner 1990: 93).

Storage jars are described as being of two body forms, the most common oval type and a common torpedo-form, both including variations in the rim forms. The oval jars sometimes have red and black painted bands. Parallels for both decoration and rim forms are cited from Hazor, mostly from strata VII–IV, with occurrences also in strata IX and III in some cases. A few parallels are mentioned from other sites: Megiddo stratum III, Tell el-Far'ah North level VIId, Tell es-Sa'idiye strata VII–IV, and Taanach Period V. The torpedo jars are described uniformly as to the body form, while exhibiting "the common lip form variations, i.e. upright, simple rim, thickened rim and slightly folded or carinated." It is noted that the torpedo-jars do not occur in stratum IC, which however included a small amount of material, thus the absence was considered probably accidental. Each rim form is given one or more examples, and all variations are described as being restricted to strata VI–IV at Hazor (Hübner 1990: 93–94). The description of jars, jugs, and juglets includes more individually analyzed items than other vessel groups. This is related to the heterogeneous nature of the material, especially the jugs, as also attested at other sites such as Tel Beth Shean (Panitz-Cohen 2009: 245), Tel Qasile (Mazar 1985: 61), and Timnah (Mazar & Panitz-Cohen 2001:109).

There are more parallels cited while discussing the small closed vessels than the other vessels. These items rather often bear painted decoration, and can be interpreted as table ware as opposed to cooking or storage wares. For example, decanters are described as one form, typical for the Northern Kingdom and attested by several cited parallels from Hazor strata VI–IV and other sites. While Hazor is still referred to in most vessel groups, the discussion also commonly includes vessels from Megiddo, Tell el-Far'ah, Tell es-Sa'idiye, and Samaria, while other more distant sites are referred to occasionally (Hübner 1990: 94–97). The description always begins with the body form, followed by a more detailed analysis of rim forms and/or surface treatments, and the parallels cited are related to these more detailed descriptions.

The reason for more intensive use of parallels is not clear, but it seems to relate to assumptions of foreign cultural influences. In the case of one jar neck (Pl. 74:6) the decoration and assumed body form are used to indicate a provenience in the Syro-Phoenician region, while a parallel vessel is referred to from Tell Keisan (a Phoenician site where the parallel vessel was interpreted as a Syrian flask), and other cited parallels were found from tombs in Amman (Hübner 1990: 94, footnotes 59–60). A small jug with two handles and red painted bands on the body has a parallel cited from a tomb at Tell er-Reqeish, considered Phoenician although located in the Southern Coastal region (Culican 1973: 67–68). The region is not considered "Phoenicia proper," but the distribution of Cypro-Phoenician jugs and juglets in the Southern Levant during Iron Age II has been well attested (Schreiber 2002: 28–34). A Phoenician provenance is also considered possible for a thin walled jug with white slip and incised horizontal lines on the shoulder (Pl. 76:1), while the more thick-walled and larger jugs were considered local ("Einheimisch"). Two well preserved jugs (Pl. 79:12; 83:6) with globular body, upright neck, and burnished surface are interpreted as imitations of Phoenician wares. The cited parallels for the three Phoenician-style vessels are all from Northern Israel-Palestine: Hazor, Megiddo, Samaria, and Tell el-Far'ah. The small jug (Pl. 83:6) is described as unpainted, although the drawing indicates red bands on the neck (Hübner 1990: 94–96). It is interpreted as an imitation of Phoenician wares by Fritz (1990: 132). Juglets are considered to be of two body forms: the globular ones, also common at Hazor strata VI–IV; and the oval ones. The latter body form was divided into two size groups. The surface treatment is discussed only for a juglet (Pl. 80:9) with red painted patterns, for which there are extant references in the literature. From the illustrations it appears that many of the 26 juglets have red slip (3), burnish (4), or both (5), while white slip (2) is less common and is not combined with burnish. The nine lamps are characterized as common variations of Iron Age II. This is the only occasion where the number of items is mentioned (Hübner 1990: 97).

Some groups or single items (mainly jugs and juglets) with several cited parallels have been attributed to a narrower chronological horizon than the vessels that are only compared with material from Hazor. Strata with comparative material are found foremost from strata VI–IV, Period VI at Samaria and level VIId or VIId–e at Tell el Far'ah (North). At points it is also noted that while parallel vessels are found from strata VI–IV at Hazor, they are most common in stratum V (and IV). The cited parallels at Megiddo were often found from two or three strata, but the general horizon is wide, varying between strata V and I (Hübner 1990: 94–97). This is probably because of problems in stratigraphic interpretation at Megiddo, and the use of type-pots in illustrations. The variation in the stratification of parallels reflects the fact that different vessel types have different chronological distributions, and they may also vary geographically.

The conclusions are focused on chronology. The comparisons with the material from Hazor are used to indicate that stratum I with its all sub-phases is contemporary to strata V and IV at Hazor. The destruction of Hazor stratum V was ascribed to Tiglath-Pileser III, and the subsequent stratum IV was dated to the end of the 8th century BCE. The absence of comparative ceramics between Kinneret strata II–I and Hazor stratum III was interpreted as an indication that the settlement at Kinneret did not continue until the 7th century BCE. On the other hand, the closeness of the ceramic material between Kinneret strata II and I was considered as indicating their chronological closeness. Therefore, stratum I was dated between the destruction caused by the campaigns of Tiglath-Pileser III in 734 BCE and the end of the 8th century BCE (Hübner 1990: 98).

Stratum II

Stratum II is represented by building activities concentrated on the hill top in areas A, B, C, and D (Fig. 3.7). The remains include a city wall, a two-chamber gate, bastion, two pillared buildings, and a domestic structure. Areas A and C were divided into two phases (Rösel 1990: 59–61; Fritz 1990: 61–65).

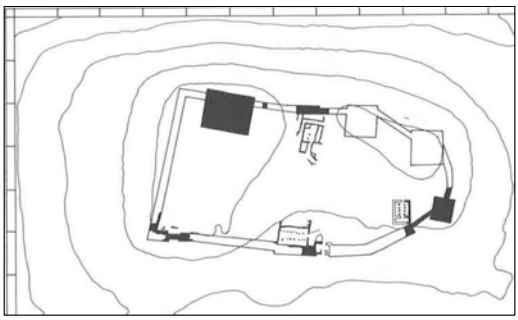


Fig.3.7 General plan of Stratum II (Fritz 1990: 8).

While the structures are described in detail, the discussion of the architectural remains includes few references to finds from these contexts. Shards of both the Iron and Bronze Ages are mentioned as a sign of the use of earlier remains as material for construction, or as a part of the description of the mixed materials in fills below the floors that result from earlier destruction (Rabe 1990: 44, 50, 55; Fritz 1990: 61).

In connection with the description of structures in area D (Rabe 1990: 43–55), selected small finds are mentioned at the end of the description of the architecture: several iron points and a fragment of a limestone incense burning box from the gate area, and a bronze figurine with pottery vessels in room 612, between the gate and the pillared building 683 (Rabe 1990: 46, 51). The most extensive use of ceramic finds in conjunction with the structures is included in the description of the pillared building 683. While the building 683 had considerable debris on the floors, which included many pottery fragments from the side rooms 684 and 663, the middle room 683 is characterized as almost devoid of finds – the distribution of ceramic finds together with the amount of ashes in the area of the side rooms is used to indicate that the side rooms were roofed spaces and the middle room was not (Rabe 1990: 55–56). The exact amount of items are not included in the discussion. Eight vessels were included in the illustrations from the middle room, while the amount of ceramics illustrated from the side rooms was 45 vessels altogether. The area of the middle room 683 was ca. 2/3 of the excavated area of the side rooms. The middle room 683 was 13 meters long and 2.05–2.45 meters wide (ca. 27–31 m^2), while the side room 684 is 26m^2 in area, and the excavated part of room 663 was 9 m long and 2.05–2.45 meters wide (Rabe 1990:54–55; Fritz 1990: Pls. 89–93). It remains unclear if the amount of illustrated items reflects the amount of excavated fragments, and if so, how closely.

At the end of the description of the remains in area A, a short note on the working stones, pottery, two cosmetic palettes, and animal bones was included for locus 102, interpreted as an open space (Rösel 1990: 61). From areas C and B1, the description of domestic remains included no references to pottery finds. Area B1 includes only few fragmentary remains of domestic structures, in addition to the remains of the city wall, and most likely the amount of finds was low. The remains in area C included a well preserved domestic house, in which two phases of use were identified (Fritz 1990: 61–66). A separate discussion of pottery follows the description of all the structures. It is divided into two phases according to the stratigraphic division (Fritz 1990: 66–68). Material that could be isolated to the earlier phase IIB derived from two loci in area A, and was comprised of 12 vessel fragments only, resulting in a short discussion, even though most items were described individually. Bowls were considered as forms of no special features, generally appearing in Iron Age II. The only krater was considered a form that shows continuity from stratum III into stratum I, while the hole-mouthed jars appeared only in stratum IIB. All vessels are given parallels from Hazor: the hole-mouthed jars in strata VIII–VII; the cooking pot from stratum VII, and the krater from strata VII–VA. The surface treatment of a jar and juglet is considered exceptional (Fritz 1990: 66).

The ceramic finds from areas where stratum II had no sub-phases, and the finds from phase IIA in area A, are discussed together. The discussion follows groups of vessels and implicit types, though some items are described individually. The bowls and storage jars are described as representing all forms common in Iron Age II, except for the cyma-profiled bowl that represents a tradition of Iron Age I. Kraters and cooking pots are described as one group, while storage jars are described as oval or torpedo-formed types, as well as individual items (Fritz

1990: 67–68). Parallels are not given for bowls, juglets, or lamps at all, and for other vessel groups comparable forms are given solely from the published reports from Hazor (Yadin 1958, 1960, 1969). The only exception is an almost whole, decorated jug/amphora (Pls. 38B; 93:6), considered unusual for the Iron Age assemblages in Israel, for which six parallels (from Tell el-Far'ah, Tell Keisan, Megiddo, Tell es-Sa'idiyeh, the Tell el-Mazar Cemetery, and tombs from Jordan) are cited (Fritz 1990: 67–68). The pottery discussion ends with an estimated dating for stratum II as contemporary with stratum VII–VI (and V) at Hazor. The foundation of stratum II is estimated around 800 BCE, and its destruction was ascribed to Tighlath-Pileser III in 734 BCE (Fritz 1990: 68; 181).

The earlier strata

Stratum III: In most excavation areas there was a considerable gap between the destruction of stratum IV and the building of the remains ascribed to stratum II. Only in area A are there remains of a building ascribed to stratum III. The building was characterized as an isolated citadel. The pottery was considered similar to that of strata V and IV. While it derived from construction fills, it provided only a *terminus post quem* at the beginning of the 9th century. The citadel was dated on stratigraphic grounds to the 9th century (Fritz 1990: 41–42).

Strata IV and V were considered the first urban phase of Iron Age Tel Kinrot, and they were discussed together. Remains were unearthed in areas A, B, C, and E. The structures included a massive city wall, remains of a warehouse, a pillared building, a partly excavated large, probably public building, and scattered walls in the vicinity of the city wall (Fritz 1990: 29–38).

The pottery from stratum V is scarce, as the excavated areas were restricted in space. The material discussed derives from areas A and D, while the other areas are taken into account cursorily as the material was considered less homogenous (Fritz 1990: 38–39). Five fragments were illustrated from area B1. They do not derive from loci mentioned in the text or indicated in the plans. Ten fragments were illustrated from area C. They derive from loci 433 and 466, close to the city wall but associated with few other structures (Fritz 1990: 32; Pl. 84). Area A also provided rather clear stratigraphic contexts for its finds: all the illustrated finds are from rooms 126 and 128, adjacent to each other, and locus 160, of an unclear connection with the rooms (Plan 2). The discussion of the pottery describes the morphology and surface treatment of single vessels in most cases. Groups of vessels are described together only in cases of cyma-profiled bowls and cooking pots. Strata V and IV are dated with the help of pottery comparisons from Hazor, Taanach, and Megiddo. Stratum V is considered earlier than stratum X at Hazor, associated with Solomon. Stratum V was thus dated to the first half of the 10th century and connected with King David's time (Fritz 1990: 39, 180). The pottery from stratum IV largely derives from destruction debris, which in many areas were not later covered by buildings and therefore could include later, intrusive materials (Fritz 1990: 39). It is characterized as being in many respects similar to the material from stratum V, and thus in the tradition of Iron Age I, while already including forms that appear first during stratum VIII at Hazor. Stratum IV was tentatively dated from the second half of the 10th century to the beginning of the 9th century

BCE. The destruction of stratum IV was ascribed to the Aramean King Ben-Hadad, according to the biblical narrative in 1 Kings 15:20 (Fritz 1990: 40; 180–181).

Stratum VI was reached only in two areas in rather small patches, and was dated to Iron Age I. In area A, four walls and two floors were assigned to this stratum. In area E, four short wall fragments and one floor level were found in one square, and an earth layer in the adjacent square was also attributed to stratum VI. The material from area A included Middle and Late Bronze Age shards, and the layering of the earth was considered indicative of the context being a street. The house remains in area E were built of middle-sized, unworked stones, and were interpreted as domestic. In general, the stratum was characterized as a sporadic, village-like settlement of the Israelites, and it was supposed that no city wall would be connected to this phase. It was considered of a similar nature with the settlement of Tel Hazor in stratum XII (Fritz 1990: 25–27; 180; for Tel Hazor, see Yadin 1972). The illustrated six fragments that derive from area E were described individually in the text. Two cooking pot fragments from area A were mentioned as being of the same type as the cooking pot fragment from area E. The description concentrates on the morphology and possible decoration. The discussion indicates a continuation of the forms at Tel Kinrot into later strata, foremost strata V and IV, but even into stratum I (Fritz 1990: 27–28).

Remains from the Early Bronze Age were not allocated a stratum, as the architectural remains excavated below the Iron Age remains were reached in very restricted areas and did not form a coherent whole. The remains in area A attributed to the Early Bronze Age included two small wall fragments with associated earth features, but no associated pottery was published (Fritz 1990: 19). In area C, the remains included a corner of a building with an earth floor and a part of a city wall (Fritz 1990: 20–21). There were Early Bronze Age pottery finds deriving from this context. The Early Bronze Age ceramics from later contexts were considered stray finds. The pottery finds served as chronological indicators for the settlement, with the help of comparisons with material from Ai, Tell el-Farʿah, Arad, and Jericho. The material was dated to Early Bronze Age II–III. The section under the heading “Dating” mainly included a discussion of pottery. Three shards with seal impressions or incisions were discussed in detail (Fritz 1990: 23–24; Pl. 54: 1–6). Several rim (62) and base (13) fragments and some body shards (8) were illustrated in plates 50–54 (83 items, see table 3.1). The description does not include any reference to the excavations in 1982 on the eastern slope of Tel Kinrot, dated from late EB I–II by Shan Winn and Jak Yakar, although the article would have provided many parallels and was known to Fritz (Winn & Yakar 1984: 26–36, 44; especially Figs. 7–10; Fritz 1990: 130, footnote 129).

Selected small finds

There is a separate chapter (11) for presenting “Selected small finds”, which includes the lion bowl of Egyptian blue, a bronze figurine of a god, inscriptions, terracotta figurines, a stamp seal, cosmetic palettes, metal items, one painted shard considered local, and a section for imported ceramics and imitations of such wares. The local painted shard includes one hand, the chest, and abdominal part of a male figure in red, with a black line going along the waist. The figure is described in detail, and several parallels in different materials and from different periods are cited. The discussion also speculates about whether the figure was a part of a war or hunting scene (Hübner 1990: 126–128).

Several ceramic items were discussed in the section for "Imported wares and their imitations", with separate sub-chapters for Bronze and Iron Age material. The Late Bronze Age material was found in Iron Age contexts and therefore considered residual (Fritz 1990: 130). The eight (local) fragments that were attributed to the Middle and Late Bronze Ages and illustrated (Pl. 55: 1–8) were not discussed at all in the report. There are five shards that were identified as Late Bronze Age imports from the Aegean (Pl. 55:9–13). Four of them were grouped together as milk-bowl fragments of White-slip-ware II from Cyprus, dated to the Late Cypriote period (1425–1225 BCE) and broadly distributed in the Levant during Late Bronze Age II, e.g. at Hazor (Fritz 1990: 130). One bowl fragment was identified as a Mycenaean import, paralleled with a form and decoration motif defined by Arne Furumark (1941), dated to Mycenaean IIIA-2 (1450–1300 BCE) and broadly distributed in Cyprus and in Palestine during Late Bronze Age II. The finds were interpreted as indicative of Kinneret as a remarkable settlement, taking part in international trade, though probably indirectly (Fritz 1990: 130).

There are five shards from the Iron Age construction fills of stratum V that were considered imports from the Aegean, based on their fine ware, surface treatments, and decoration. The body shards (Pl. 66: 12–15) were identified as Cypriote Black-on-Red ware of not more closely defined dating, while the base with black painted circles on yellow slip (Pl. 66:16) was ascribed to the Cypro-Geometric I style (Fritz 1990: 131), dated to the Early Iron Age (Schreiber 2002: 15–17). Three shards from stratum I (Pl. 83:9) were also identified as Cypriot imports of Cypro-Geometric I–III (Fritz 1990: 131). Influences of Cypriot, Phoenician, and Assyrian traditions were identified in the material from stratum I, for which the analysis partly overlaps that of Hübner (above), and the differences between the analyses indicate that the material was equivocal and open to interpretation. These vessels were considered local imitations that did not attain the quality of the originals (Hübner 1990: 91–98; Fritz 1990: 131–132).

The parallels cited include assemblages from Assyria proper, Megiddo, Tell Keisan, Tell el-Far'ah in Israel-Palestine, and Tell el-Mazar in the Jordan valley, as well as other literature (Fritz 1990: 131–132, especially footnote 142). One small closed vessel (Pl.76:23) was analyzed both by Hübner and Fritz, who interpret it differently. Hübner considers it to be a pyxis and refers to comparable items at Tell el-Farah North level VIId and Megiddo strata IV–III (Hübner 1990: 95), while Fritz interprets it as an Assyrian style mug, together with another, smaller vessel in Pl. 65:15, and finds parallels from Tell Keisan level V, Tell el-Far'ah level VIIe, and Tell el-Mazar (Fritz 1990: 131–132). The rim fragment of a jar (74:6) was also analyzed by both slightly differently. While Hübner considered it to be Syro-Phoenician import (Hübner 1990: 94), Fritz considered it to be an Assyrian or Assyrian-style vessel (Fritz 1990: 132). Though one of the cited parallels is the same (two vessels from a tomb in Amman), the conclusions are slightly different. Cypro-Phoenician influence is identified in a wider variety of vessels by Fritz, who includes several slipped bowls and painted, rounded kraters in addition to the closed vessels also identified by Hübner (Fritz 1990: 132 cf. Hübner 1990: 91–97).

The imported wares and their imitations were of special interest, as they were considered important for both dating and inferring cultural influences. These aims are at the heart of culture-historically oriented archaeology, which forms the framework of Volkmar Fritz. The Early Bronze Age project at Tel Kinrot by Tel Aviv University, conducted only in 1982, had a different focus. These excavations exposed smaller areas and focused on the Early Bronze Age. The analyses of pottery as well as lithics included both morphological descriptions focusing on form, and a quantitative study. The coding of pottery included attributes related to technology as well as vessel form and surface treatments, including decoration. It explicitly aimed for both seriation (with chronological interest) and identification of the functional areas of the excavation (Winn & Yakar 1984: 34–35). Such a tradition is in line with processual archaeology, a research tradition that first started to gain ground in Israeli archaeology of the prehistoric periods (e.g. Dessel & Joffe 2000; Chesson 2000).

The role of pottery in the report

The function of the pottery in the report was foremost to serve as a chronological indicator. The interpretations of space use are based mainly on the structures and on the nature and layering of the fill. The fill soil of the rooms was identified as evenly stamped earth, while that of streets was identified as containing much ash, bones, and mixed refuse (Hübner 1990: 81). Pottery finds are not explicitly used for functional interpretations. The description of ceramic finds concentrates on morphology and surface treatments. Not every vessel is ascribed to any specific type, and the description can be characterized as an implicit typology. The forms are described and examples of them are given in the plates. The described details concerning rim forms or surface treatments are included as variations inside a functionally associated basic form. Referred parallels serve as a chronological anchoring of the assemblage. For the remains of stratum I, parallels are cited from a wider variety of sites than for other phases (Hübner 1990: 92–98). The functions of the vessels are not discussed, even though the names indicate an assumed use for *cooking* pots and *storage* jars explicitly, and for lamps, bowls, and jugs in a more implicit way while using modern vessel categories.

Features or vessel forms are sometimes characterized as common, like the modelled rim of oval jars (Hübner 1990: 93), or rare, like the inwards bent rim of oval jars or chalices (Hübner 1990: 94, 96), but without any counted occurrences. The table in Fig. 3.8 presents the illustrated ceramics of the phases that are discussed in the report. The vessels are organized according to functional classes appearing in their description. The material regarded as Middle and Late Bronze Age stray finds (Pl. 55: 1–13), Persian period ceramics from fills (Pl. 99: 1–5), and the pottery from the stratum III building are excluded, as there is no discussion of these ceramics in the text. The ceramics from buildings 810 and 891 ascribed to stratum II or I (Pls. 97–98) are excluded, as there is no discussion of the material except for a mention of its general similarity with material from both strata II and I (Fritz 1990: 91). Hellenistic vessels (Pl.99: 6–22) are included, as there is a detailed discussion of them even though the remains were not stratified. Likewise, most of the Early Bronze Age ceramics were considered stray finds, but there is a detailed discussion of the material. From those contexts, were the illustrated material can be considered very small (13, 17 and 22 items), the discussion includes practically an individual description of each fragment, or a group of a few items considered belonging to the same group, such as the two Iron Age pithos fragments and five Hellenistic unguentaria (small, narrow bottle).

vessel group	counts of illustrations (items with surface treatments or decoration) / *items mentioned in the text*													
	EB-ceramics		Stratum VI		Stratum V		Stratum IV		Stratum II		Stratum I		Hellenistic	
bowls	18 (17)	*6*	1	*1*	3	*3*	16 (9)	*4*	58 (37)	*55*	111 (96)	*69*	6 (6)	*6*
chalices	-	-	-	-	-	-	1		1 (1)	-	1 (1)	*1*	-	-
kraters	-	-	-	-	2 (2)	*2*	8 (3)	*2*	9 (4)	*7*	25 (14)	*25*	-	-
cooking pots	-	-	3	*3*	12	*12*	26	*22*	37 (1?)	*34*	54 (1?)	*51*	4	*4*
jars	53 (35)	*16*	1	*1*	2	*2*	7 (2)	*7*	34 (5)	*28*	40 (14)	*33*	-	-
pithoi	-	-	1	*1*	2	*2*	-	-	1 (1)	*1*	-	-	-	-
jugs	3 (2)	*2*	1 (1)	*1*	-	-	1 (1)	-	9 (3)	*7*	22 (9)	*20*	-	-
juglets	-	-	1	*1*	-	-	1	-	10 (2)	*9*	27 (15)	*17*	-	-
flasks	-	-	-	-	-	-	-	-	2 (1)	-	4 (2)	*3*	-	-
pyxides	-	-	-	-	-	-	2 (2)	*2*	1	-	1 (?)	*1*	-	-
lamps	-	-	-	-	-	-	1	-	4	*4*	10	*9*	2	*2*
other	-	-	-	-	-	-	-	-	-	-	2	*2*	5 (2)	*5*
shards	9 (8)	*2*	5 (5)	*5*	1 (1)	*1*	-	-	-	-	4 (4)	*1*	-	-
Total	83 (62)	*26*	13 (6)	*13*	22 (3)	*22*	62 (17)	*37*	165 (55)	*145*	301 (156)	*216*	17 (8)	*17*

Fig. 3.8 Illustrated ceramic vessels in the excavation report of Kinneret (1990). The row for jugs also includes decanters and amphoriskoi. Mentioned vessels includes vessels discussed individually, as well as listed items.

In the case of cooking pots from strata II and I, though a majority of all illustrated vessels is listed, the discussion included descriptions of two (Fritz 1990: 67) and four basic forms (Hübner 1990: 93) respectively. Similarly, all large groups of vessels, i.e. bowls, kraters, and storage jars were described as a few basic forms accompanied with lists of examples (Fritz 1990: 67; Hübner 1990: 91–93). As to what items were considered as mentioned in the text in Fig. 3.8, these were all items with individual descriptions, but also all items included in lists, and thus considered as belonging to a certain described type or form. The number of vessels treated individually would be a significantly lower number. Vessels that are considered special and unusual are described in more detail, and for them more parallels are cited than for the common vessels. This is common in the reports, as well as in specialist articles and in contemporary pottery studies (e.g. Arie 2013; Panitz-Cohen 2009; Yannai et al. 2003; Yasur-Landau 2006). This imbalance has been noted previously (Hunt 1987; Philip 2013).

Chapter 4 Formation of the Assemblages

The artifact assemblages reported in archaeological studies and reports are not equivalent to the material that was originally found. There are several points where the material and observed features are selected by either the field archaeologist, the registrar, the analyst, or the report editor. Each step in these selections usually diminishes the material by removing some artefacts from the assemblage.

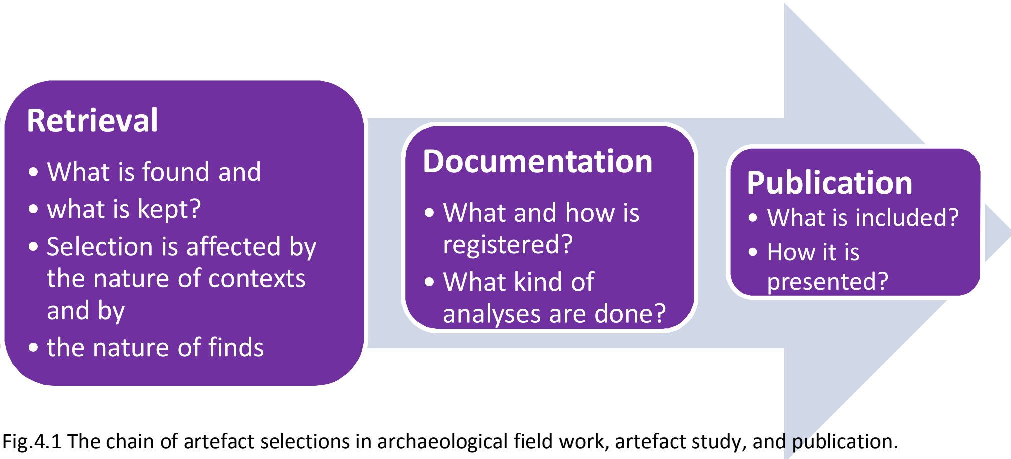


Fig.4.1 The chain of artefact selections in archaeological field work, artefact study, and publication.

In this chapter, I will explore the chain of decisions relating to artifact retrieval in the two excavation projects at Tel Kinrot, the one lead by Fritz in 1994–2001 and the Kinneret Regional Project (KRP) in 2002–2008. I will also explicate two differing strategies within the KRP: the intensive retrieval strategy of areas U and W, and the informal selection strategy of areas N, R, and S, where work begun earlier by Fritz was continued. I will start with the topic of recording in archaeology in general, and the principles of documentation that have been expressed in manuals and that appear in reports (4.1). Then, I will shortly summarize the background information of the two Tel Kinrot excavation projects, the origin of the ceramics in this study (4.2). Next I will describe the collecting of the pottery in the field at Tel Kinrot for both projects together (4.3), as for this practical part the differences between the projects were small. However, when I discuss the strategies related to making the decisions of what to keep or discard (4.4), and what to analyze further and how (4.5), I will describe the two projects separately, because there are several differences. There is no final report yet that could be analyzed of these excavations, but I will briefly discuss the preliminary reports as well as published articles for the projects at the end of this chapter (4.6).

4.1 Pottery Recording and the Pottery in Excavations and Reports

"What excavators are trying to do and what they do are not identical, and neither may mirror what they say they are doing" (G. Wright 1966: 115). Principles of archaeological field work, as well as post-excavation analyses, are expressed in manuals, while the praxis can be detected (partially) from the field recordings and archaeological reports. The pottery has a long path from its retrieval in the field to its presentation in an archeological report. Some features relating to pottery are recorded as a part of field recording, while other aspects are focused upon during the post-excavation analyses. The publication of pottery in the final reports relies on the post-excavation analyses and forms a basis for the interpretations of the history of a site. Surprisingly little interest has been paid to the processes that transform the excavation into a publication (Jones 2002: 46). Most post-excavation analyses consist of observations and descriptions of the material, coupled with comparisons with other objects relevant for those studied. Recording methods reflect this background (Jones 2002: 47).

Documentation forms vary from excavation to another, even though there are general principles shared by most excavations and promoted in manuals (e.g. Joukowsky 1980; Fritz 1985; Barker 1993). The recording of artefacts (as well as loci and other aspects) during a project is often a relatively stable process. In some countries, and in many institutes, there is a certain, persistent way of recording, and forms for field work and those for the finds are standardized, e.g. the Israel Antiquities Authority or Tel Aviv University (Fritz 1985: 55; Masur et al. 2013: 2). Such forms function as a check-list for the field archaeologist and artifact analyst alike, while the standardization also helps them to be as consistent and as objective as possible in their descriptions (Joukowsky 1980: 228–233; Barker 1993: 163). On the other hand, the recording sheets may be planned for a specific project, and thus adapted for the expected material (Joukowsky 1980: 289–295; Pfälzner 1995: 9–12; Schmidt 2013: 5–22). Standards may help to compare materials from different sites if forms are used in a consistent way. At the same time, however, standardized forms may have the effect of fossilizing some observations regardless of their potential usefulness, and at worst they may prevent new insights. For example, a tradition of recording grits observed in the clay body of pottery has been persistent in Israeli and Jordanian reports even though it has been criticized as useless (Franken 1969).

Archaeological reports tend to be written in the culture-historical tradition, where artefact studies have foremost a chronological function, coupled with themes of identifying cultural groups (Jones 2002: 50–51; section 2.5 above). “Despite the development of archaeological theory, site reports remain written within a rationalist and objectivist framework. This is where requirements of culture-historical analysis are preserved, even when a person with a different theoretical orientation excavates the site” (Marciniak 2003: 210). Information on the field work, the field documentation, and the analysis of the retrieved materials, would in many cases be needed in order to evaluate the conclusions drawn from the material. However, this information is often not published (Marciniak 2003: 210). Archaeological data collected and analyzed is influenced explicitly, but also implicitly, by different social and technical factors. Even the original field recordings are interpretations of the phenomena excavated and are thus secondary – even though after the excavation is complete they will become the primary resource for all later studies (Oikarinen 2012: 193).

Archaeological knowledge is produced within a hierarchical framework: while a group of individual excavators do the practical digging, they are supervised by an area or site supervisor. The recording of the unearthed features is the work of a supervisor or specially chosen excavators – individuals with more skills, training, conscience, or talent (as perceived by the supervisors). Often it is the site-director who collates and selects the information that will be included in the site report to make a smooth whole. The post-excavation analyses fragment the presentation of the materials among several specialists focusing on different materials and using different methods (Jones 2002: 44–46). However, the fragmentation starts already during the field work.

There are two widely used manuals that specifically relate to archaeology in Israel and Jordan: a manual rooted in the Gezer excavations, edited by Dever and Lance (1978), and a monograph by Joukowsky (1980). Volkmar Fritz also wrote an introductory study book for the archaeology of Palestine, with a chapter focusing on field methods, including the stratigraphic method of excavation (Fritz 1985: 35–45; 49–65; Fritz 1994: 39–48; 52–66[7]). It has been demonstrated that the concepts used in the documentation forms vary, both as to the words used for similar phenomena and different meanings of the same words (Masur et al. 2013; Oikarinen 2015: 33–34). The concepts used in documentation are an integral part of the work and may well have an effect on the practical digging. Therefore, it is important to be aware of the central documentation concepts, and the ensuing possible changes within them.Because the meanings attached to the concepts may vary, it is also important to examine the praxis along with the principles.

4.2 Background Information on the Projects

The excavations at Tel Kinrot can be described as a project of two generations of field work, with continuation as well as innovations. The two projects form a continuum with each other, but there are reasons to draw a line between the 2001 and 2003 seasons: the team and organization were transformed, documentation forms were renewed, and the retrieval strategy for pottery was partially changed. While some adjustments were made in the practices of field work, the most important differences relate to documentation. The content of the documentation forms was renewed, and they were converted to a digital format.

4.2.1 Excavations Lead by Fritz 1994–2001

The excavation project started with preparatory work in 1992, and excavations took place from 1994 to 2001. The project continued the 1980's excavations, which had focused on the acropolis, while now the aim was to extend the understanding of the city on the slope (Fritz & Vieweger 1996: 81–83). Volkmar Fritz directed the work, with changing co-directors. Campaigns were four to six weeks long and took place annually, except for the summer of 2000, when excavations were cancelled. As is common in Israel, volunteers were recruited as a workforce (Dietrich & Münger 2000: 47–48). There were around 35–50 volunteers in most seasons (Fritz & Vieweger 1996: 83; Särkiö & Valkama 2006: 227), ca. 60 volunteers in 1999 (Münger 1999: 17), and 13 in 2001 (Särkiö & Valkama 2006: 221). Several institutions took part in financing and carrying out the excavations: the Universities of Mainz, Bern (since 1997), and

[7]The text for the English translation (1994) was slightly revised in many places. However, the changes in the parts that are of interest here are small, and I prefer to use Fritz's original text as the base text.

Helsinki (since 1998), the Roman-German museum in Mainz, the German Institute of Archaeology in the Holy Land, and the Institute of Theology Wuppertal.

The structure of the excavation team can be described as hierarchic, and the division of responsibilities was clear. The ultimate responsibility and power lay with the excavation director Fritz, and the co-director was of a secondary position (AW2013; AK2014). The practical work was directed by area supervisors, assisted by experienced volunteers working as square supervisors. Such a strategy of learning as an apprentice is common in archaeology, where digging is often regarded as a skill. The novices learn the skills of digging under the guidance of more experienced supervisors (e.g. Joukowsky 1980: 27, 160–161; Barker 1993: 109; Edgeworth 2003: 77–78). Experience leads to the development of an intuition that an archaeologist may and should use and combine with systematic working methods (Joukowsky 1980: 175). In addition to the director(s) and area supervisors, square supervisors and volunteers, the team included a registrar (in 1994–1999 Anke Welzel, in 2001 Virpi Holmqvist), an architect, a draftsperson, a camp-manager, a restorer (in some seasons the pottery was restored after completing the field work), and a photographer (in some seasons the photographs were taken by area supervisors and a co-director).

4.2.2. Kinneret Regional Project (KRP)

A new organization was established in 2001. The first excavations were planned for the summer of 2002, but they were cancelled for safety reasons. Large scale excavations took place in 2003–2005 and 2007. The campaign of 2006 was cancelled. The last excavations in 2008 were of a smaller scale (Münger et al. 2009). A short documentary film illustrating the practical work was shot in 2005, and is available at the project's web-site.

The KRP excavations were directed by Stefan Münger, Juha Pakkala, and Jürgen Zangenberg, from the universities of Bern, Helsinki, Leiden, and the Institute of Theology Wuppertal. Mainz University was also a partner, represented by Wolfgang Zwickel. The area supervisors were mostly students and researchers from Helsinki and Leiden universities, and in addition a senior Israeli archaeologist Eliot Braun in 2004. The campaigns included four weeks of excavating with volunteers, who were mainly students from the participating universities, but also from various other backgrounds. The structure of the team was, broadly speaking, similar to that during the Fritz excavations. However, the staff was slightly larger, as in addition to the previously mentioned specialists, paleo-botanists were now included in the field staff, as well as surveyors. A restorer (or two) was now always included in the field staff.

4.3 Prelude: How was the Pottery Treated in the Field?

The Tel Kinrot excavations were conducted stratigraphically, following natural layers. The excavating took place in a 5 meter grid, where 0.5 or 1 meter wide balks were left between the excavated squares, thus leaving a 4.5–4.75 x 4.5–4.75 meter area excavated. The sections visible in the balks were used as a stratigraphic control (Holladay 1978; Lance 1978; Joukowsky 1980: 150–156, 206–214; Fritz 1985: 49–55; Barker 1993: 100–117; Mazar 1997: 14; Ussishkin

2004: 41). The stratigraphic method includes excavating in natural layers, documentation of the excavated *loci* (sg. *locus*, a unit of excavation), and their interpretation. The separate documentation of each excavated locus ensures a proper registering of all finds, while the well documented finds enable one to trace the settlement history (Fritz 1985: 36). For Fritz, the settlement history was the ultimate goal of archaeology. In order to achieve the historical interpretation, all layers or all finds are not of equal importance, and structures and layers that contain remains of the settlement, such as those resulting from construction, habitation, and destruction are more important than layers that portray abandonment. However, according to Fritz, all materials should be similarly treated (Fritz 1985: 45–52).

Field work represents the primary encounter with the archaeological artefacts. The differences within the practical field work between the Fritz and KRP excavations were small, and they are not the focus of this study. There were adjustments within the field work strategies between the project lead by Fritz and that of the KRP; some of them relate to practical digging, sifting, and taking measurements, while others relate to documentation. However, the documentation and practical digging are related, and a change in the concept of locus has consequences for the practical work. In the following paragraphs, I will first describe the collecting of the finds in the field, and then explain the conceptual differences that appear in the documentation.

In the field, the majority of pottery fragments are scattered within the earth, and they become loose when the earth is picked and troweled. Such loose shards were collected in a 10 liter bucket assigned for each locus. In the field, the pottery of each locus was collected in separate buckets, assigned with running numbers. In practice, the pottery bucket (called 'basket' in the documentation) is the smallest unit in the excavation documentation (Lance 1978; Masur et al. 2013: 5). It was a general rule that the collecting buckets should not be over half-filled. This was both to prevent spilling and to allow for more control over the context of the pottery, as levels were measured for each basket and most loci would produce many buckets of find materials (recorded as baskets). The practice of changing half-full buckets ensures separation in contexts with much pottery, and the amount of ceramics often grows when a floor level is close (Fritz 1985: 54). In general, the artifacts were collected in the field in a way common in the Near East, and described by Joukowsky (1980: 177–179). However, during the excavations lead by Fritz an exception to the above was that bones, as well as stone artifacts, were all collected in the same bucket with the pottery and separated first after washing. This must have led to breakage of bone material in many cases. During the KRP, ground stone artifacts were collected as separate baskets, and bones were placed in paper bags within the pottery buckets (with the same basket number). As for the lithic artifacts, most of them were found within the loose earth, and collected in the general pottery basket. If a well preserved lithic tool was identified in situ, it was be treated as a special find and received its own basket number. During the Fritz excavations, intact vessels (if they were found *in situ*) were given their own collecting buckets and basket numbers, levels were measured for them, and they were marked on the map. During the KRP excavations, concentrations of shards, as well as intact vessels or working stones, were given their own buckets (and basket numbers), measured at their location, and marked on the map.

The unit of a basket could in retrospect be re-located to another locus if this was deemed necessary (see Lance 1978). Such re-allocations remained visible in the paper documentation of the Fritz-campaigns, while such transparency may or may not be present in the digital documentation of the KRP. The basket lists of Fritz included elevations, but no description of the earth material. The basket documentation of the KRP included descriptions of the earth as to its color, consistency and inclusions, as well as details concerning the field methods, such as whether sifting was conducted or not, and which kinds of tools were used. Such details enable one to assess possible factors related to finds retrieval. For example, when large tools are used and sifting is not carried out, the smallest artifacts are easily missed. During the Fritz campaigns, sifting was not carried out as a routine. It sometimes took place when a floor was expected (MA2013, SM2014). Such a practice of selective sifting was also used at Timnah (Mazar 1997: 15). Within the KRP sifting was a common practice in the stratified contexts.

Fritz's definition of a locus is narrow in principle: each distinctive earth layer or identified change in construction is defined as a locus (1985: 50; 1994: 53). However, there is an option to keep several earth layers within the same locus and only change the collecting bucket (and recording basket), which enables one to keep material from different layers separate from each other (Fritz 1985: 54; 1994: 56), a principle similar to that of Aharoni et al. (1973: 119–120). In practice, Fritz allowed the area supervisors freedom as to the definition of a locus: it could indicate a fairly large unit, such as a room. Small differences in soil as well as built features within the unit, such as ovens, could be assigned their own locus numbers or could be described as features within a more broadly defined locus. Such a flexible approach appears in the report from the excavations on the acropolis, when descriptions of areas B and A are compared (Hübner 1990: 81 vs. Rösel 1990: 85–86). During 1994–2001, the general approach was not to have many small loci with only minor differences between them. A floor was to be defined as the bottom of a locus (MA 2013, SM 2014). At the same time, a narrow concept of locus could be used as well, as was the case for example in Area N (1998–1999). In the field, the collected baskets were marked on a plan, and on a basket list with their elevations (SM2014). The locus card was filled in as a free text (see Appendix 4B), thus the form did not guide its user as to the content of the description. In addition to the forms, area directors generally kept diaries of the field work. At the end of each field season, the supervisors of the excavated areas wrote field reports that were sent to the Israel Antiquities Authority as well as circulated within the team.

Within the KRP, a decision was made to consistently prefer a narrow locus definition: each phenomenon should be considered a locus of its own – the oven as well as its foundation pit, for example. This concept of a locus has been in use in the Israeli tradition since Kenyon's excavations in Jericho in the 1950's and by others from the 1960's on (Lance 1978: 76; Dever 1980: 44), while some scholars opted for more flexibility (like Aharoni et al. 1973). The narrower concept of a locus has been explicitly used for example at Dor (Sharon 1995), Timnah

(Mazar 1997: 15), and Lachish (Ussishkin 2004: 45). However, the term often remains undefined in the site reports, for example Megiddo IV (ed. by Finkelstein et al. 2006) and Hazor VI (ed. by Ben-Ami & Ben-Tor 2012). The locus cards developed by Münger for the KRP (Appendix 4C) aimed at fine grained distinction between the loci. In addition, the description of earth features (structure, color, inclusions etc.) was made more consistent by adding multiple choice fields for them. The form included separate sections for interface clarity, physical description, and interpretation. This organizational structure aimed at separation in the record of observation and interpretation (SM2014). The form now also included the initials of the supervisor.

Even though a common definition of a locus was established in the KRP, this was not the case for a *clean* locus (a term commonly used to indicate a locus with chronologically homogeneous pottery material, see p. 24 above). A definition of a locus as 'clean' was not used, even though the pottery study during the field work focused on the identified time periods. Actually, the pottery reading was recorded more accurately as each diagnostic shard in each basket was counted according to its estimated time period, and these counts were typed into the field documentation. In most baskets, there would be a few early shards originating from the Early Bronze Age. At the same time, several floor contexts were protected by a thick earth layer and contained fair amounts of restorable pottery dating to the Early Iron Age. These contexts were easy to identify. Defining such contexts as 'clean' would not have aided in their interpretation.

I had a presumption that defining loci consistently in the narrow sense within the KRP excavations (and in area N 1998–99) might have the effect of increasing the amount of kept ceramics, when compared to the excavations (of most areas) led by Fritz. This was because I thought that a selection of ceramics would have been kept from each locus. If this would have been the case, the increase in the number of loci as a result of the stricter separation of earth features should have had such an impact, at least to some extent. Therefore, I read through the locus cards of the excavations directed by Fritz, and paid attention to the loci, their definition, the reasons given for starting a new locus, and their sizes in general. However, my initial presumption appeared false: there were loci where all the material was discarded. Such cases included most surface contexts and mixed deposits close to the surface. However, they also included stratified contexts. Such cases mostly included baskets which were marked as including little material, or the pottery was considered "undiagnostic" (or both). Also, shards chronologically identified as Early Bronze Age material within an excavated context that was considered Iron Age could be discarded. This was most likely because they were considered residual. The narrower locus definition adopted within the KRP did not appear to me as an important factor in the resulting ceramic assemblage. At the same time, the selection process that took place after the actual excavation appeared to me as a crucial point. This selection can be considered a stepwise process, where each step has implications for the next ones. The first step is the decision of how the amount and nature of all excavated pottery is to be documented. The next step is the decision of how much of the originally excavated material will be kept. The third step is determining how much of the material kept is then to be analyzed, and how. A fourth step is how the analysis is documented, and the fifth and final step is how the results are published.

The locus cards that were used during the Fritz excavations closely follow the tradition represented by Aharoni (Aharoni et al. 1973: 130; Appendix 4A and B). Similar forms were used, for example, at Timnah (Mazar 1997: 14–17). The remarks on the pottery baskets may or may not include a written description of the amount of ceramics. In the documentation during the Fritz campaigns, the remarks on the pottery in the collected baskets focused on the periods identified, while remarks on the state of preservation, ware, or amount were mainly absent. When the amount was mentioned, the adjectives used indicated that only a small amount of a certain period was identified (e.g. 'little EB', 'very little MB–LB'), as opposed to the main period of the basket ('mainly IAI'), or if there was a small amount of material in the basket all together ('little material'). It was also occasionally indicated that the basket included one or two shards of a certain period, or altogether. The description of the locus on the locus card was free text, and information on finds could in principle be included, but the descriptions focused on earth and architectural features. Therefore, there is no consistent portrayal of the amount of pottery, nor of the amount of other artifact fragments. However, there is a change during the excavations directed by Fritz in this regard, showing that Fritz could allow grounded, deviating practices and adopt new ones: the pottery shards were counted in area N in 1999 (supervised by Axel Knauf), while the pottery, stones, and bones were weighed in 1999 in area H (supervised by Stefan Münger). In 2001 the pottery, stone artifacts, and bones were weighed in both excavated areas R and T (supervised by Juha Pakkala, Juhana Saukkonen and Merja Alanne). The weights of the material in the locus as a whole are included in the digital locus cards that were archived as printouts. Digital locus cards were used in 1997 in area M, and in 1999 in area H. The weights of the collected baskets were measured already in 1997 and 1998 in areas M and Q, respectively (supervised by Stefan Münger). However, the weights were not marked on the locus cards, nor on the basket lists archived in Mainz. In the digital locus registration form of area H in 1999, there was an added field where the weights were inserted. In 2001, the locus cards were typed into a Microsoft Access file.

4.4 First Selection: What Is Kept in the First Place?

The validity of artifact studies depends both upon the accuracy of the analysis and the representativeness of the sample in relation to the materials of the site (Joukowsky 1980: 282). Some aspects of the validity of the sample cannot be controlled, such as if the excavated area was exceptional in its ancient function. Retrieval strategies are an aspect of sampling we can control. If excavated material is neglected (which is inevitable when only a selection is analyzed), the risk of false interpretations increases.

Both the archaeological context from whence the material was derived as well as the nature of the pottery material itself have an effect upon the selection. As to the contexts, the major division at Tel Kinrot, as well as in Israeli excavation reports (e.g. Arie 2006: 192), is that of mixed contexts vs. well defined or *clean loci*. The clean loci are foremost defined by having chronologically homogeneous pottery, and such loci are considered more important than mixed loci including material from diverse periods. This definition is based on Albright's work (Davis 2004: 73–74). In addition, well preserved contexts and loci that are considered secure in their stratification are considered more focal (see Arie 2006: 191, 289). The major defining characteristic of pottery is that of *diagnostic* vs. undiagnostic material (see below).

4.4.1 Fritz: Pottery Reading and Keeping Strategy

A description of the process relating to pottery retrieval at Schechem in 1969, led by George E. Wright, could as well be of the Fritz excavations 30 years later, and many contemporaneous excavations (SM2014). Cole reported the study – thorough and careful at that time:

> All pottery was saved from each digging locus until it had been washed and examined. Usually several basket separations were made within a single digging locus, in order to ensure maximum control over the separation of materials from adjacent soil layers. After the washed sherds from each basket were examined to determine the periods represented by the analytical pieces (pieces showing rim, handle, base or distinctive decoration or ware features) a record was made of this information and the bulk of the pottery was then discarded. From most baskets of potentially significant loci, however, a selection of analytical sherds were retained and given individual registry numbers (Cole 1984: 3).

The process at Tel Kinrot was in line with this tradition: all excavated pottery was collected, washed, and let dry in shallow, plastic baskets. On the next day, each of the baskets was examined individually by a team consisting of area supervisors, the registrar, and the excavation director(s). This joint examination of ceramics, 'the pottery reading' (Fig.4.2), is an arena of important decisions. The decision of what to keep as important (diagnostic) relies on the excavation director and on the team taking part in the pottery reading.

Fig.4.2 Pottery reading in 2001. Around the table: Martti Nissinen, Merja Kaario, Sanna Aro-Valjus, Juha Pakkala, Volkmar Fritz, Virpi Holmqvist and Juhana Saukkonen. Photo: Jaana Hyvärinen, © KRP.

“The analyst must select the artifacts he or she considers important enough to catalogue” (Joukowsky 1980: 32). This decision is very important, as it will determine the assemblage that will serve as the basis for research and the following interpretations. Even in cases where all material is kept, selection is needed when it comes to the documentation. “Most artifact study is susceptible to bias – all too often it is the horizon marker or the pretty object that is selected for documentation at the expense of other artifacts” (Joukowsky 1980: 286). However, all artifacts and artifact fragments are not equally informative, and one should be able to take this into account. Should one aim at a representative random sample of all excavated items, with the cost of leaving some special and informative items outside the study material, or should one rather sacrifice the representativeness and use subjective judgement of what is important? The latter strategy has been common in Israel, and was also used by Fritz. The shard material may be overlooked, especially in situations where there are complete or restorable vessels from the same context. For such a reason, it was decided at the Megiddo excavations (area K), to count all rims only from two rooms of a building with a vast amount of finds, while in a context with meager finds, rims of all loci were counted (Arie 2006: 191).

During the Fritz campaigns, shards were kept mainly if there was no restorable pottery, or if they were of special interest, such as imported wares. Pottery was kept foremost from “clean loci”, that is, loci consisting of pottery of only one period. The aim was mainly to use such shards as a dating device (Fritz 1985: 59; 1994: 61; AW2013; SM2014). There were no clear criteria for keeping or discarding pottery shards. A selection was kept from most loci (SM 2014). There were 1029 loci with pottery finds altogether, out of which 830 had at least a selection kept. However, 192 loci had all pottery baskets discarded. Most of these loci had only one or two baskets, and often they had been considered mixed or chronologically undiagnostic, with many of them being described as including little material. Seven loci had baskets with missing information. The amount of kept shards bore no fixed relation to the amount originally found in the locus. However, during the selection in the field reading there was a tendency to keep material from a basket in such a way that the retained pieces would roughly reflect the periods originally identified: if a basket mainly included Iron Age pottery and little Early Bronze Age material, a few EB-shards and several shards of the Iron Age would be kept (SM2014). The pottery from the excavations in 1994–1999 was in general neither counted nor weighed, and an indication of the full amount of collected pottery as a whole cannot be retrieved (Münger 2005: footnote 16).

The principle expressed by Fritz was that all *important* finds shall be recorded individually (Fritz 1985: 59; 1994: 60). The pottery was treated differently, as only a selection of the retrieved material was kept, reflecting the attitude that not all of it was important. The material of each bucket (basket) was assigned to its chronological period on a daily basis. If restorable material was expected, all material from the locus was temporarily kept for the restoration. Rims and bases could be kept for further analyses. Shard material was analyzed further only if it was needed for dating due to the lack of well-preserved ceramics, or because of other special interests (Fritz 1985: 56, 59; 1994: 58, 61). In principle, the pottery could also be registered as a group on a separate form, indexed according to the locus where the material derived from: “The pottery which is not marked, and therefore not indexed, is statistically reckoned, together with the marked pottery, on a separate index card, so that all pottery of the individual locus is registered” (Fritz 1985: 59; 1994: 61). However, the practical implementation of such group-documentation remains obscure, and documentation forms for pottery other than the find cards for single items did not exist.

Keeping in mind that the principles have to be adapted to the circumstances, and that the praxis may deviate from them for several reasons, I found it necessary to investigate the praxis of selecting the material as well. The sources for this can be found within the locus cards, which include some information on the “raw data” about the pottery baskets and which material was marked as being taken for restoration, kept, or discarded. The information of the content and fate of each collected basket was documented in basket lists, and the same information was transferred manually onto the locus cards, which I have used as the source material. The information about the baskets in the locus cards includes their number, (lowest) level, list of identified periods under a heading “remarks”, and the keeping policy, coded with + for material (partially) kept, – for all material discarded, and R for all material kept for restoring. After restoring, at least the body shards that were not fit to the restored vessels would be discarded. In addition, a column marked with צ (Hebrew tsade for צִלּוּם ‘photo’) would be ticked if a photo was taken in the field of the material found in situ. This coding was similar to the forms presented in the Beer-Sheba I report (Aharoni et al. 1973: 121).

While the information in the locus cards is in this respect fragmentary, I interviewed several participants to clarify the situation. I selected the persons that I asked to be interviewed mainly from the permanent staff members. Altogether I held seven interviews of six informants. As the finds treatment was the task of the registrar, I interviewed Anke Welzel, the main registrar of the Fritz excavations (May 2013 in Berlin). I sent a request for an interview for all such area supervisors that had attended the field work at Tel Kinrot at least three times and had some institutionalized archaeological training. Interviewed persons were Merja Alanne (April 2013 in Helsinki), Stefan Münger (twice in March 2014 over Skype), and Axel Knauf (April 2014 over Skype).[8] In addition to the experts above, I interviewed two participants that did not become permanent members of the excavation team. I interviewed Pekka Särkiö (April 2013 in Helsinki) and Martin Hallascka (September 2014 in Hamburg) in order to gain a perspective closer to that of the participating students. Särkiö was a square supervisor in the 1998 season. He was thus in a lower position in the excavation hierarchy than the area supervisors. Särkiö had previous experience of archaeological field work and he had made detailed, illustrated notes during the field season of 1998 that I was able to use. In addition, he had written an article about the Tel Kinrot excavations and had a special interest in archaeological work (Särkiö 1999). Hallaschka participated as a volunteer during the 1998 season. Interviewing

[8] Altogether I sent a request for six expert-informants, but two did not respond: registrar of the 2001 season (Elisabeth Holmqvist) and one former area supervisor (Jürgen Zangenberg).

persons who had different tasks in the excavation team brings about a certain disentanglement. I considered this good, as it brings different aspects to the excavation work and organization. I started the interviews with Särkiö because I wanted to practice the situation in Finnish with someone, who was not a key informant. The last interviews in 2014 (Knauf and Hallaschka) did not bring notable new information, and therefore I concluded that I had reached a saturation point.

During the Fritz-excavations, a selection of *diagnostic* items was kept from clean loci in order to verify the assigned date of the locus. An item was considered diagnostic if it could be identified as to its period, and often to a functional vessel type as well (AW2013; SM2014). Presence-absence data was considered important, while the frequency information was of lesser interest (AW2013; SM2014). When a pottery basket was marked with a plus, indicating that there was material kept, there is no information about how many and which kinds of items were kept: the code is the same whether only one fragment was kept or if all shards were retained. Because the amount of items originally collected (until 1999) or the amount of items kept as a selection was not recorded, it is fairly impossible to find out from the documentation what kind of a selection was kept and how it related to the original material excavated. In the participant account of the 1998 season, Pekka Särkiö wrote that from the daily pottery reading a few, representative items from each locus would be kept (Särkiö 1999: 433). At the same time, the recollection of Anke Welzel was that not a single rim shard was discarded (AW2013).

In order to find out how large a part of the excavated ceramics were generally kept (in part or wholly), and what kind of baskets were discarded fully, I read closely through the locus cards of six areas excavated in 1994–1998 (areas E, F, G, H, J, and K) and three areas excavated in 1999 and 2001 (H, R, and T), and tabulated the recorded strategy of keeping material from the baskets along with the remarks included on them and the stratification of the loci. I included areas from all excavation seasons, and areas from both the upper and lower slope. Areas E, F, and G lie on the upper slope, while areas H, J, and K are situated on the lower slope (for a map, see Appendix 1). Fritz ascribed the excavated Iron Age phases into three general strata. In all these areas, the baskets that derived from the topsoil or the mixed colluvium below the topsoil have more material discarded than the stratified deposits. From the stratified layers, the baskets that were marked as including undatable/undiagnostic ceramics (abbreviated as "UD"), were often also fully discarded.

Stratigraphy and Material of Areas E, F, G, H, J, K, R, and T

Area E was excavated already in the 1980's. The work continued in 1994–95, with six new squares. **Area F** (one and half squares) was opened on the east side of area E, connected to it. Three phases of Iron Age habitation were identified in these two areas. The remains were dated to Iron Age II, based on the pottery finds. Area F was excavated only in 1994. The architectural remains of area F were few and badly preserved (locus cards E and F). There was a fair amount of baskets with restorable pottery (21 % in area E; 18 % in area F). Coupled with the fact that Iron Age II material had already been studied and published from the previous excavations, this probably lead to a fairly low amount of baskets with a selection kept (44 and 55 % respectively) and the high amount of baskets with all pottery discarded (35 and 13 % respectively). The higher amount of discarded material in area E (35 %) is partially explained by the higher share of baskets with little material altogether (7 % in area E vs. 3 % in area F).

Area G was excavated during four seasons (1994–97). It was opened in order to study the city wall and its relation to the habitation within the city and the excavations focused on the defensive structures. The city wall had three phases, and the glacis had at least two phases. The oldest phase of the wall and glacis was dated to Middle Bronze Age II, based on the pottery associated with it. A new wall and glacis were built on top of the older ones in Iron Age I, and the latest wall was built later during the Iron Age. It is unclear whether a glacis was also rebuilt in the last phase of the city wall (Fritz 1996; 1997, unpublished). Five phases of habitation could be discerned (G1–G5). The lowermost phases (G4–G5) were dated to Middle Bronze Age II and to the Early Bronze Age respectively. However, these phases were excavated in very restricted scale and only a few loci of Bronze Age remains included pottery. Two phases were dated to the Early Iron Age (G2–G3), and the earlier of them (G3) was in a few contexts divided into two sub-phases. Most of the excavation focused on the remains from the Early Iron Age, and most of the pottery material derives from the Iron Age layers (locus cards G). As a result of the focus on massive structures, a high amount of baskets were marked as including only little material altogether (25 %) – material deriving from constructions. This must have resulted in the fairly high amount of baskets with all pottery discarded (33 %).

Area H on the lower slope (Fig 1.2) was opened adjacent to the city wall. Here, the Bronze Age remains were found close to the surface, below a fine grained, grey alluvial fill indicating abandonment, which was identified below the topsoil. Thus, the excavation focused on these domestic remains. No ceramics were found *in situ*. The scanty pottery material derived from fills and the shards from floors were considered stray finds. Iron Age remains were few and fragmentary, due to erosion (Fritz & Vieweger 1996: 83–84). The amount of restorable ceramics is especially meagre (less than 2 % of all baskets). However, the amount of baskets with kept pottery during 1994–96 is especially high. This is most likely because area H was the first encounter of Bronze Age materials so far largely unattested at the site. The same reason most likely resulted in a high amount of baskets fully discarded during 1999 in area H: there was already a fair amount of Bronze Age material kept, and the fragmentary finds were mostly of forms already attested.

Area J was also opened close to the city wall, at the lowermost part of the slope descending towards the sea. The inner side of the Iron Age city wall was excavated, but remains of earlier fortifications were absent. The excavations focused on domestic structures of the Early Iron Age. These remains were divided into two phases. Restorable vessels were found from floors (Vieweger 1995; Fritz & Vieweger 1996: 6; Kaliff 1996; Schefzik 1996). While not more than 16 % of baskets included restorable pottery, the high amount of baskets with all pottery discarded is surprisingly high (37 %). The amount of baskets with little material altogether is fairly low (4 %) and does not help to explain the amount of discarded ceramics. The fairly high discard rate may be due to the accumulation of ceramics dated to the Early Iron Age within the project, and thus less new forms retrieved; to the high amount of restorable Iron Age I ceramics from Area K excavated during the same seasons; and to the found ceramics themselves, which were considered less interesting. In fact, 32 baskets were characterized as including non-diagnostic ("UD") pottery, which is a higher share of baskets (7.5 %) compared to areas K and G, where the amount of baskets marked as "UD" is 5 % of the total.

Area K was excavated during four seasons (1995–98). With 27 opened squares, it was the largest area excavated in the 1990's. The domestic remains of the Early Iron Age were ascribed to three strata and (VI–IV), and stratum V was divided into two phases due to the presence of raised floor levels and architectural modifications in some buildings (Fritz & Münger 2002). The remains ascribed to the earliest phase of Iron Age habitation (K3, Stratum VI) were excavated on a limited scale. This phase had suffered from later construction and stone robbing. No pottery was found to be restorable. In contrast to that, the ceramic finds from the floors of stratum V (K2) were rich and well preserved. The builders of stratum V (K2) used remains of earlier structures as foundations, indicating that this main phase of the Early Iron Age occupation was built soon after the destruction of the earlier, foundation phase (K3). In addition, no layer indicating abandonment appeared between the phases of the Iron Age habitation. The rich household pottery inventory, working stones, remains of fallen mudbrick walls, burned bricks, and ash layers indicate a sudden destruction of the settlement in the earlier phase of stratum V (K2B), while the contexts of the later phase (K2A) were generally poorer in finds. The later phase K2A had suffered from later construction. Scattered remains of the latest Iron Age phase (K1, Stratum IV) were found in less than half of the excavated squares. These remains were close to the surface and had suffered from erosion, and the architectural features did not make a coherent whole. Only few floors could be identified, of which one was rich in pottery finds (Busch & Sasse forthcoming). Bronze Age remains in Area K were reached in a small sondage, yielding few finds. The fairly high amount of fully discarded baskets (20 %) is probably the result of two factors: first, the amount of baskets with little material altogether is relatively high (9 %), and these were often fully discarded. Second, Area K produced much restorable ceramics (32 % of the baskets) which were kept, and the need to rely on fragmentary material for dating or other interpretations was thus diminished.

Area R was opened adjacent to area J in 1998 in order to check the stratigraphy of the habitation close to the city wall (Kaario & Zangenberg 1998). The work continued in 1999 and 2001, and again during the KRP. The first two seasons focused on Early Iron Age remains (R1–R2), while some Bronze Age remains were reached on a limited scale already during 1999 (Kaario & Hagenow 1999). In 2001, the excavators opened three new squares and continued work in six squares opened in 1990's. The 2001 season aimed to establish a connection between the habitation and the Iron Age city wall, and to clarify the stratigraphy of the Bronze Age phases. However, the Bronze Age phases were not reached. The Iron Age remains were ascribed into two strata R1 (stratum V) and R2 (stratum VI). Of these two, the later stratum (R1) was badly eroded, and included only little pottery, while the earlier one (R2) was better preserved and could be divided into two phases (Pakkala & Saukkonen 2001). The fact that it was the earliest Iron Age phase – presumed to be stratum VI, which in other areas had produced little remains and finds – which appeared to be well preserved in area R, probably resulted in a fairly high amount of baskets with material kept (70 %). At the same time, there was very little restorable material from this area (2 %). In order to have material from the foundation phase of the Iron Age occupation included in the research assemblage, the fragmentary material was the only possible material to study. In area R there was also an especially high amount of baskets having only little material (36 %), which were fairly often discarded, resulting in a fairly high amount of fully discarded baskets (27 %).

Area T lies on the mid-slope and was restricted to two squares. Altogether 26 loci were defined (20 with ceramics). Eleven loci were ascribed to the topsoil and the fill below it (T0); ten loci were ascribed to the Early Iron Age, divided into three phases (T1–T3). Two floor levels were identified with the help of hard surfaces as well as a large amount of Early Iron Age pottery, including restorable vessels. Three loci below theIron Age remains were dated to the Early Bronze Age. The amount of baskets fully discarded is relatively low (17 %) and the amount of the baskets with material kept is fairly high (65 %). There was also a notable amount of restorable ceramics (18 % of baskets). The fairly low discard rate may be due to the fact that area T was physically isolated from other areas, and it was excavated only during one season (2001).

The selected areas on the lower slope are adjacent to areas that were excavated by the KRP. Excavation areas form three fairly large fields on the lower slope, while the areas excavated in the middle of the slope are unconnected to each other. Most excavation areas lack a physical connection to each other, and I prefer to use local phases. The number of loci with pottery in these areas, the amount of collected pottery baskets, the characterization of the amount of ceramics, the number of baskets with kept or discarded material, and baskets taken for restoration, is summarized in Fig. 4.3. The total number of baskets is not always equal to the sum of baskets kept, discarded, and taken for restoration, as there were a few baskets with missing information. For example, in area F, 5 out of 38 baskets, and in area K, 4 baskets out of 978 had missing information.

I assume that from the baskets sent for restoration at least a selection would have been kept, and therefore the last column in Fig. 4.3 includes the joint share of baskets with material kept or taken to restoration. The areas with the highest amounts of baskets, including material kept for restoration (areas E and K), have less baskets with a selection kept. Area H during seasons 1994–1996 stands out, with the high percentage of baskets with material kept. This is probably due to the fact that earlier phases were hit directly below the topsoil, and the area was thus different from the other areas of these excavations. During the 1999 season in area H, the number of baskets where the amount of material was described as small increased compared with the earlier seasons in the area. At the same time, there was already a fair amount of material kept from the area from the earlier seasons. These two factors probably affected the exceptionally high amount of baskets that were fully discarded in area H in 1999.

			basket information									
Area	seasons	n of loci including pottery	n of pottery baskets	baskets with (very) little material: n;	%	material kept (+): n;	%	material fully discarded (-): n;	%	material kept for restoring (R): n;	%	Kept (R/+) baskets together (%)
E	1994–95	46	164	12	*7.3*	72	*43.9*	57	*34.8*	35	*21.3*	*65.2*
F	1994	14	38	1	*2.6*	21	*55.3*	5	*13.2*	7	*18.4*	*73.7*
G	1994–97	160	467	117	*25.1*	284	*60.8*	154	*33.0*	29	*6.2*	*67.0*
H	1994–96	66	319	14	*4.4*	263	*82.4*	54	*16.9*	5	*1.6*	*84.0*
J	1995–96	121	428	17	*4.0*	191	*46.8*	158	*36.9*	69	*16.1*	*60.7*
K	1995–98	215	978	88	*9.0*	458	*44.6*	200	*20.4*	316	*32.3*	*79.1*
H	1999	73	274	42	*15.3*	162	*59.1*	112	*40.9*	0	*0*	*59.1*
R	2001	59	164	59	*36.0*	114	*69.5*	45	*27.4*	3	*1.8*	*71.3*
T	2001	20	158	16	*10.1*	102	*64.6*	27	*17.1*	29	*18.4*	*82.9*

Fig. 4.3 Table of baskets collected under Fritz' direction in selected areas, number of loci and baskets altogether, and those marked as including little or very little material, as having material (selection of) kept (+), with material fully discarded (-), and fully kept (during the campaign) for restoring (R). The last column gives the joint share of baskets taken for restoration and baskets with material kept of all collected pottery baskets.

4.4.2 Kinneret Regional Project: Field Reading and Keeping Strategy

The following section about the retrieval strategy of the KRP is based on three sources: my own memory (and notes made during seasons), the interview of Stefan Münger (2014), and the pottery readings as documented in the database. The fact that I was involved in the project as a finds registrar (2003) and registrar for finds other than stone objects (2004–2007) is both an advantage and a challenge. The advantages include a familiarity with the practicalities of the work that may affect many decisions. Such issues are practically never discussed in reports or any parts of the documentation, except for occasional mentions that may occur in diaries kept by different participants. My work during the excavations was primarily concerned with pottery and other finds, from their arrival from the field to their documentation, analysis, and storage. Daily work included cleaning, labelling, sorting, and the logistics of items to be further restored, drawn, and photographed. My involvement cannot be considered as an anthropologist's participant observation (see e.g. Constable et al. 1994–2012; Connelly & Clandinin 1990). In qualitative observation research the relationship between the observer and the studied group is a formulated one: the role of observer is defined by a quality of being an outsider, and the observing itself is the major work in the field. My own participation was focused on the work with the finds. I was simply registering data related to the pottery material retrieved. I did not collect and organize my own experiences in a systematic manner, nor did I aim at including them in any later study. I cannot claim objectivity or neutrality for them. On the contrary, they are to be held as biased and subjective understandings. This does not make this insider knowledge irrelevant or meaningless, but requires a critical attitude towards it. A subjective insider view can even add to the explanatory potential and understanding (Grönfors 2011: 5).

Unpacking the work in the KRP was far more complicated than I had expected it to be. This is partly due to the complications affected by the constant development of retrieval strategies, and amendments made to the recording database. As the locus cards and basket lists were slightly different during the earlier seasons than they were during the last seasons, they are at some points difficult to compare with each other. The database was annually updated to the most improved version, and earlier typed information was also transferred to the later version, although the newly introduced fields remained empty for the earlier seasons.

All pottery buckets were weighed before washing. In some cases, the shards of not closely identifiable early material ("UD") were also counted. In area U, there are 56 baskets which have both been weighed and had all the shards counted. However, the number of counted shards and the weight of the basket are not strongly related. This reflects the fact that the size of the shards (and that of the original vessels) is not evenly distributed. There are baskets with small shards (e.g. 17 shards with a weight of 100 g altogether), and baskets with 1 or 2 large fragments of coarse ware that weigh 700 g each. Similarly, in area S, 28 baskets were weighed and all their shards were counted as well. The weight of a shard varies from 5 grams on average for small and worn shards to a large base fragment of 2.5 kg. The general shard size may be indicative of the nature of the context and post-depositional processes like trampling.

A separate form was created for the recording of the pottery reading in the field (Appendices 4C and 4D). This form included the count of identified diagnostic shards according to the periods, and notes on whether the diagnostics were rims or other parts. In addition, the amount of diagnostics kept was marked on the form, if a selection was retained. Other remarks could be marked down for each counted period, if for example specific wares were identified. Within the KRP, there were two distinctive strategies of retrieval practice for the pottery: 1) informal selection in the earlier excavated areas (N, R, and S), and 2) an intensive retrieval in the new excavation areas (U and W), as well as a sub-area of area N which was excavated as area U and later on assigned as a part of area N, where it belongs architecturally. These two strategies were in use side by side: the traditional strategy within the "old areas" and the new strategy within the "new areas." Because the intensive strategy would require more resources, and I was the only registrar that could work with the material year-round, we decided to adopt it only in the areas which could be excavated as coherent units within the KRP.

Informal selection strategy in the "old areas"

Three excavation areas (N, R, and S) that were already excavated before 2002 were continued within the KRP. The informal selection strategy, following the tradition of Fritz's excavations, was used in these areas. This meant a relatively intuitive selection of pieces that were considered diagnostic, including generally those considered most informative. A sample was kept from most loci where diagnostic material was identified, except loci of topsoil or the mixed fill below the topsoil. The material from these contexts could be fully discarded. Sifting was done selectively, mostly in expectation of a floor. The work in these areas included to large extent balk removal, in addition to a few new squares or half squares that were opened.

Area N (see Appendices 4I and 4J for a map) is situated on the northwestern corner of Field I, delineated on its southern side by the street 3520 and area U on its other side. In the east, it is delineated by the street 3522/4129 and area S on its other side. It consists of domestic structures with rooms and small courtyards (Knauf & Müller-Clemm 1999: 7–12), and a small public space with an open area including a tabun oven and domestic pottery (Nissinen 2007: 14–16; Nissinen & Münger 2009). Area N was excavated during two seasons, supervised by Martti Nissinen (2005) and Martti Nissinen and Kirsi Valkama (2007). However, the sub-area supervised by Valkama was excavated as area U, and an intensive retrieval strategy was used. Therefore, this sub-area is here considered as area U. Excavations in Area N did not proceed below the Iron Age levels. Thus all stratified deposits below the topsoil and erosional fill below it, relate to the Iron Age habitation. The Iron Age remains have been divided into three strata (N1–N3). The oldest of them (N3) was excavated on a limited scale. It corresponds to the foundation phase of the Iron Age city (stratum VI by Fritz). Both strata N1 and N2 present the remains of Main Iron I habitation and correspond to the stratum V assigned by Fritz (Nissinen 2007). The latest stratum of the Iron Age (N1) was subdivided into two phases.

keeping strategy in area N	**2005**	*%*	**2007 (MN)**	*%*
selection kept	40	*40*	41	*33*
all diagnostics	9	*9*	17	*14*
all kept	10	*10*	11	*9*
all discarded	39	*39*	48	*38*
unknown	2	*2*	8	*6*
baskets with pottery	**100**		**124**	
Nature of context for (pottery) baskets				
disturbed, e.g. topsoil and colluvium	60		15	
fill – street fill	14		5	
artificial stone fill	3		12	
destruction debris/ fill of or on floor	20		81	
in pits, in installation or within wall	3		8	
all collected baskets	**107**		**143**	
defined loci	**24**		**49**	
Pottery material				
Total weight of pottery*(kg)	371		239	
Total of counted rims	641		422	
counted other diagnostics	208		239	
registered vessels/shards	**7**		**19**	
registered other ceramic finds	9		6	
registered stone objects	33		12	
Amount of kept shards*^{2}	234		416	

Fig. 4.4 Retrieval strategy of area N. *Seasons 2005 and 2007 (MN) both include a basket without a weight. The vessel (2007) was a small flask, while the shard concentration (2005) could not be restored. *^{2} Selections kept without the amount of retained shards recorded are two, comprising 16 identified shards altogether.

In area N, there were 73 defined loci with pottery (Fig.4.4), out of which 68 were earth features. The relatively high amount of loci is due to the work being mainly (stratigraphic) balk removal. Especially during the season of 2005, there were many loci of topsoil and colluvium below the topsoil. During the season of 2007, the relative amount of contexts relating to habitation was higher. Altogether 250 baskets were collected, most of which contained pottery (224), being over 600 kg. Half of the collected buckets with ceramic finds (115) were from contexts that were excavated from the balks left standing after the 1990's excavations. During the season of 2007, the work was continued deeper from the level where the excavations had ceased in 1999. For the KRP seasons together, 1063 rim fragments and 447 other (chronologically) diagnostic fragments were counted during the field work. Most commonly all shards were discarded (88 baskets), but nearly as often a selection was kept (81 baskets). The fully discarded baskets included 15 baskets with only body shards of coarse ware and no chronologically identified material. In some cases, all material considered diagnostic was kept (26 baskets). The contexts from which all diagnostics were kept derive to a large extent from contexts where the excavation passed below the floor levels of the earlier project (not from the balks) and/or contexts defined as destruction debris (also from the balks). Thus such baskets (altogether 47) derive from stratified Iron Age deposits. In addition to contexts interpreted as destruction debris, these baskets derived from accumulation on a floor (1), the construction fill of a floor (3), a wall (1), stone fill inside a room (2), and the fill of street (3) – contexts that are of importance for interpreting the stratigraphy.

In 81 cases, a selection of diagnostics was kept. The amount of selected shards is not strongly related to the amount of counted diagnostics in the basket, or to the weight of the basket. Rather, the selections included 1–4 shards regardless of the amount originally retrieved. Most commonly 1 shard was kept (19 baskets). The baskets from cleaning and surface survey also often had a selection of 1–4 diagnostics kept. While these contexts were unstratigraphic, the selection was related to the fragments themselves as easy to identify, large, or decorated. The contexts from which a selection was kept do not differ from those in area N in general. About half of these baskets derive from balks, and 20 % are from contexts considered destruction debris. During 2005 in area N, the soil was not sifted at all. Likewise, in 2007 sifting was exceptional in the sub-area supervised by Nissinen: only three baskets were marked as sifted. They all derived from contexts that were considered destruction debris. However, most (41) baskets from contexts defined as destruction debris (excavated by troweling) were not sifted. Thus there are destruction debris-contexts that were fully discarded, that were selectively kept, and from which all diagnostics were kept. While the nature of the contexts was similar, the retrieval action appears to be a result of what *kind* of pottery fragments there were in the collected baskets.

There was more material kept and stored than has been registered. According to the field reading, 650 pottery fragments were kept. However, there are only 26 ceramic vessels/vessel fragments registered in detail (6 %). The registered shards show a bias towards decorated fragments (7 items). In addition, two jar fragments with seal impressions (one from the Early Bronze Age and one from Early Iron Age) are registered. Two larger parts of vessels were retrieved (one flask and one chalice bowl), and these were naturally registered as well. The registered items poorly represent the original excavated material. At the same time, twelve stoppers and three spindle whirls were registered and photographed. These objects were considered whole objects and therefore special finds, though not chronologically diagnostic.

Area R (for a map, see Appendix 4I) was excavated in 1998–2001 by Fritz. Unlike the other areas further studied during the KRP, in area R there is a continuity of staff members involved. Area R was excavated during four seasons in the KRP. In 2003 it was supervised by Virpi Holmqvist, Juha Pakkala, and Juhana Saukkonen, and in 2004 by Eliot Braun. In 2005, the area was divided into three sub-areas. The work in sub-areas R1 (supervised by Saukkonen) and R2 (supervised by Mikko Laitinen) was focused on the Early Iron Age domestic structures and streets, while in sub area R3 (supervised by Pakkala) the excavations extended into the earlier phases of occupation. During the 2007 season, the work in sub-area R2 was supervised by Mark van der Enden and Coen Bernoster, and sub-area R3 was again supervised by Pakkala.

During 2003, three new squares were opened, five previously opened squares were further excavated, and six balks were removed. Most of the work concentrated on the Iron Age layers and later deposits, while in two squares, on the southeasternmost fringe and lowest part of the excavated area, remains dated to the Middle and Early Bronze Ages were excavated as well. This lowermost part of Area R was later labelled sub-area R3. Altogether, 100 loci were defined and 209 baskets with pottery were collected (Fig. 4.5). The amount of baskets with all diagnostics kept is especially high (52 %), and they derive to a large extent from the Bronze Age deposits.

During 2004 the work focused in the northern part of area R with Iron Age remains. Excavation included the removal of five narrow balks wholly, and two partially. In addition, a strip between two walls and a balk was excavated in a previously excavated square (CD14). The excavation reached contexts that could be connected with rooms excavated in the 1990's. Altogether 50 loci were defined, and 104 pottery baskets collected in 2004.

There was more material kept and registered from area R in 2005 than from areas N or S. The keeping strategy was more intensive in two ways: the selections were larger, and it was more common to keep all diagnostics. This is at least partially related to the excavations in the Bronze Age phases, which were otherwise little known at the site. These contexts had a markedly more intensive strategy of pottery retrieval. However, the pictures from the separate sub-areas are different.

Area **R1** was excavated only during the 2005 season, supervised by Saukkonen. The work concentrated on stratigraphic balk removal on the eastern fringe of area R, occupied by a street. In addition, several test trenches were cut into the floors of the major domestic complex of Area R. There were 58 loci defined and 76 baskets with pottery collected. Even though a major part of the excavations focused on searching the street level and baskets included mainly worn pottery shards of mixed periods, the amount of registered ceramics was not lower than in the other parts of area R with Iron Age habitation remains. In point of fact, it was relatively high: a third of the diagnostics was kept and over half of them were registered.

Area R2 is situated in a corner of areas U, N, R, and S. It was opened in 2005 and the excavation continued in 2007. Its main goal was to clarify the stratigraphy and function of the area excavated in the 1990's as area N. There were 93 loci defined, and 284 baskets of finds and soil samples were collected. In 2005 most of the work consisted of removing balks on the ancient area of a street, similar to the work in area R1. The material was mostly mixed and could not be connected to any structures. This explains the low percentage of kept pottery finds. However, the amount of registered pottery fragments (91) is relatively high. During the 2007 season stratified Iron Age remains were reached, and the amount of kept shards was considerably higher. However, the amount of registered pottery items is very small (7 items, 1%). This probably relates to the fact that there was much pottery, including restorable vessels from area S during the same season, and their registration was considered more important.

Registered baskets and loci in area R	2003	%	2004	%	R1 2005	%	R2-2005	%	R2-2007	%	R3 05-7	%
all discarded	*51*	*26*	49	*47*	34	*48*	99	*71*	14	*12*	32	*29*
selection kept	*35*	*18*	32	*31*	14	*20*	20	*14*	28	*25*	47	*43*
all diagnostics	*100*	*52*	14	*13*	16	*23*	16	*12*	65	*57*	22	*20*
all kept	*7*	*4*	9	*9*	7	*10*	4	*3*	2	*1.8*	4	*4*
unknown	-	-	-	-	-	-	-	-	4	*3.5*	4	*4*
baskets (with pottery)	***193***		**104**		**71**		**139**		**114**		**109**	
baskets (total)	***236***		**115**		**84**		**152**		**132**		**138**	
Nature of context												
disturbed, e.g. topsoil	*48*		8		31		58		23		45	
reddish soil/habitation	*20*		0		22		2		50		58	
pottery concentration	*2*		1		3		2		6		2	
colluvium/grey fill, street	*40*		60		15		59		31		4	
Total pottery weight (kg)*	430		162.7		129		259.1		220		92.6	
Total of counted rims	1145		349		275		571		559		248	
counted other diagnostics	**1017**		355		50		121		214		790	
defined loci	**100**		**50**		**28**		**41**		**52**		**50**	
registered vessels/shards	**293**		**51**		**55**		**91**		**7**	*!*	7/64	
reg. other ceramic finds	**26**		10		4		12		**5**		1	
registered stone objects	37		25		13		23		15		7	
Amount of kept shards**	**1380**		212		103		139		679		302	

Fig. 4.5 Table of features, of the contexts of the baskets and the material kept in Area R. *the weight of most object baskets is missing, thus the total is too small. **Some selections do not include the amount of shards kept; in R2, 2007 it was assumed to be the same as counted rims, while for the other sub-areas the amount was assumed to be 1, because that was the general trend in these sub-areas.

Area R3 was excavated in 2005 and 2007, during both seasons with a small team working in a small area only. The work in area R3 focused on the Bronze Age phases at Tel Kinrot. There were 50 loci defined and 138 baskets collected, with most of the work being carried out in 2007. The picture in area R3 is different from the other sub-areas in R. The total weight of excavated pottery is lower, while the identified shards are much more abundant. This is due to their Bronze Age context. There were 64 shards registered in the database, which is over

20% of all kept pottery shards of this sub-area. However, most of them are registered with far less details than the items from other areas and sub-areas of area R. The registration only includes a designation of the period (EB) and an identification as a pottery vessel. Only 7 pottery items were registered with a similar level of details as the Iron Age material.

Area S is situated in the middle of the excavation field I, and forms a point of encounter and overlap of the areas previously excavated as areas J, N, and R (for a map, see Appendix 4I). It forms the northern part of a domestic house that was earlier excavated as area R. During the KRP, work in the area included mainly removal of balks left standing in the 1990's and two trenches dug below the earlier excavation's final levels. The aim of these excavations was to find surfaces associated with the structures excavated earlier, in order to refine the stratigraphy and check connections between certain walls. Eventually, the stratigraphy was revised to some extent, when several phases of the Early Iron Age were defined (Braun 2004; Saarelainen 2005). Area S was excavated in 2005–2008, supervised by Katri Saarelainen. A special challenge in this area was the scattered nature of the excavating balks during 2005 and 2007. Only during 2008, two and half new squares were opened. In area S (2005–2008), there were 206[9] loci defined. The large amount of defined loci is a consequence of the work with balks, and the lack of connection between the excavated locations. There was also a large amount of "cleaning loci." These contexts included material collected while cleaning loose soil from squares excavated earlier, including earth and shards that had been washed into the squares during the winter rains. The excavations did not continue below the Iron Age layers.

During the 2005 season, when the area was started, more than half of the collected baskets were fully discarded. This is related to the nature of the contexts: material derived only from topsoil removal or cleaning the old squares before excavation could continue. These contexts were unstratified and did not relate to habitation. The layers related to settlement were first reached in subsequent seasons. These layers consisted of destruction debris, identified from their reddish color, mud brick fragments and pottery from Early Iron Age, including restorable vessels. During these seasons (2007–8), the proportion of material kept increased so that it was most common to have a selection of pottery fragments kept (37–39 %), while all diagnostics were kept in 14–26 % of baskets. The high amount of baskets with all material kept in 2007 reflects the high amount of restorable ceramics during that season. The relatively low amount of all diagnostics kept in 2007 results from the high amount of restorable finds during the season. The soil from contexts considered mixed (all contexts in 2005) was not sifted. During 2007–2008 sifting was sometimes conducted when a floor was expected to be close, identified by an increased amount of pottery and reddish soil with mud brick or plaster inclusions. However, most contexts with reddish soil or restorable pottery were not sifted either. At any rate, these contexts were excavated by troweling.

[9] The database includes altogether 260 loci for area S, but this number includes 54 loci defined in 1996–1999.

During the 2007 and 2008 seasons there was a large amount of pottery found on floors in area S. Most commonly a selection of 3–5 shards from each basket was kept. The amount of selected shards is not strongly related to the amount of counted rims or other diagnostics. The field counting included 2636 rim fragments and 439 other shards considered diagnostic. While there were more than 800 pottery items that were kept, only 13 % of them were registered. Altogether, there were 103 ceramic vessels or vessel fragments registered. Most of them (58) are well preserved items, including a large part of the vessel profile. In addition, there are 22 rim shards and 23 decorated body shards or handle fragments. Several spindle whorls, stoppers (42 other ceramic finds than vessels), and stone objects were also registered.

keeping strategy in area S	**2005**	*%*	**2007**	*%*	**2008**	*%*	**2005–08**	*%*
selection kept	24	*18*	78	*37*	66	*39*	161	*31*
all diagnostics	20	*15*	29	*14*	45	*26*	94	*46*
all kept	11	*8*	24	*11*	4	*2*	39	*8*
all discarded	73	*56*	59	*28*	46	*27*	178	*35*
unknown	3	*2*	23	*11*	10	*6*	36	*7*
baskets (total)	**131**		**213**		**171**		**515**	
disturbed, e.g. topsoil	52	*40*	40	*19*	29	*17*	121	*23*
reddish soil	28	*21*	109	*51*	101	*59*	238	*46*
pottery concentration	4	*3*	23	*11*	36	*21*	63	*12*
grey fill	36	*28*	3	*1*	0		39	*8*
defined loci	**60**		**64**		**81**		**205**	
Total weight of pottery*	251.65		412.6		341.1		1005.35	
Total of counted rims	651		1041		944		2636	
counted other diagnostics	74		186		179		439	
registered vessels/shards	**8**		**40**		**55**		**103**	
reg. other ceramic finds	5		24		13		42	
registered ground stone objects	9		32		21		62/80**	
Amount of kept shards*	216		369		221		806	

Fig. 4.6 Table of features, of the contexts of the baskets and the material kept in area S. *Counts are biased towards low values because of missing data: the weights of restorable vessels are commonly not recorded and sometimes the size of the selection is missing. ** The amount of registered stone objects includes 62 objects and 18 possibly worked stones. The counts for each season separately only include clear objects.

The intensive retrieval strategy in the new areas

Area U was the first excavation area in which intensive retrieval was used. The area was excavated during three seasons (2003–2005), supervised by Merja Alanne and Kirsi Valkama. During a fourth season (2007), the work continued in a few spots. Five squares were opened, and most of the balks between the squares were removed. Area U was opened in order to connect old areas excavated by Fritz. Therefore, squares were opened on the southwestern fringe of excavation areas N and S, reaching towards area K. However, the bedrock is high in the southwestern end of area U, preventing the connection between the areas (Alanne & Valkama 2003: 15; Alanne & Valkama 2004, 1–2, 4; maps in Appendices 1, 4I and 4K).

The Early Iron Age remains in area U portray three strata (U4–U2), one of them (U3) having two phases. The latest remains (U1) only include two walls that are hard to date, as no floors could be connected to them and the contexts had suffered from erosion. The latest typologically identified pottery fragments from between the stones of these walls were identified as Iron Age IIB shards, providing the earliest possible date for their construction. The Iron Age I remains of stratum U2 consist of several structures constructed from large boulders. Some structures reuse earlier remains of stratum U3. The excavated area of U2 is dominated by a paved open spacewith a small structure (4207) within it. A small and worn pyxis (10357/1) typical of Iron Age I was found under one of its corners, and may provide a date for its construction in the Early Iron Age, if it is a foundation deposit – or a *terminus post quem* for this small structure of U2. The pottery from the fills connected to the stratum U2 structures was dominated by Iron Age I fragments. However, the area was not sealed, it had suffered from erosion, and typologically later shards appear in some of the associated fills. The richest Iron Age I remains are those of U3, divided into two phases. The space was dominated by a fairly large open space and a small room 4301 with a plastered floor and a tabun 4287 in its corner. Within the room, the destruction of phase U3B had left a ca. 30 cm thick layer of mudbrick and plaster fragments, ash pockets, and a large amount of pottery on the floor, mixed with the destruction debris above the floor. Also the courtyard included several well preserved vessels along ground stone tools. The well preserved pottery from the room included thirteen small containers, four cooking pots, two jars and one chalice. The restorable vessels from the open space were containers (Valkama 2007; Valkama & Alanne, forthcoming).

The earliest Iron Age remains have been fragmentarily exposed. In addition, later activities have destroyed them to some extent. Therefore, these remains appear in a fragmentary condition. A wall of large boulders bordering street 3520, connects with several other wall fragments. Earthern floors connecting to these walls, were hard to distinguish from the debris accumulated upon them. The architecture as well as the pottery material indicate the domestic nature of the contexts. The dating of stratum U4 relies on the typological dating of the pottery, which is dominated by Iron Age I types, while some fragments typical for earlier periods appear as well. Stratum U4 appears to be the foundation phase of the Iron Age city, and probably correlates with the stratum VI defined by Fritz. The earliest remains in area U (stratum U5) include two plastered surfaces on the bedrock and two cup-marks embedded into one of them. Fragments from the Early Bronze Age dominated the pottery from these contexts, while shards from the Middle or Late Bronze Age were identified as well (Valkama & Alanne, forthcoming).

Area W was excavated in 2004, supervised by Juhana Saukkonen and Virpi Holmqvist. The area was opened adjacent to the old excavation area K on its eastern side. The goal for area W was to study the terracing uphill from the previously excavated area K, and to clarify the stratigraphic questions that had remained open during the earlier excavations. In addition, the area elongated the section on the slope, providing a wider exposure of the urban settlement (Saukkonen & Holmqvist 2004). Five squares and half of one balk were excavated. The latest remains (W1) were largely eroded and fragmentary. The connected materials were mixed with surface debris and could not give secure dating for the phase. However, the ceramics are dominated by material typologically dated to the Early Iron Age, and the fragmentary structures may belong to the same habitation phase as the remains Fritz attributed to stratum IV. Two well-preserved phases (W2–W3) from the Early Iron Age included walls and floors of domestic structures, and a street with a channel for drainage along a wall supporting the street. The channel was built in phase W3, and it continues in area K excavated in the 1990's, and was assigned there to stratum V by Fritz. The phase W2 bore traces of fire and a thick destruction debris of mudbrick remains on floors. However, the amount of restorable ceramics was low: only one upper part of a pithos could be restored. The earliest phases (W4–W5) were excavated on a very limited scale. The remains attributed to W4 can be dated to Iron Age I and may be correlated with the foundation phase of the Iron Age city (stratum VI by Fritz). (Saukkonen & Holmqvist 2004). In addition to areas U and W, a part of area N (excavated as area U and later assigned as area N, where it architecturally belongs), was retrieved intensively during the 2007 excavation season. The work was supervised by Valkama. The work in all the three areas of intensive retrieval focused on the Early Iron Age remains.

Intensive retrieval meant keeping all identified rims, and an informal selection of other diagnostic items (mainly decorated shards, Early Bronze Age material). However, within the areas planned to be retrieved in an intensive way, the shards were in the beginning kept according to the traditional, informal strategy: pottery from the topsoil and the mixed fills below the topsoil were in most cases kept according to an informal selection strategy. Only in one square were these mixed deposits kept in the same intensive manner as the rest of the loci. Ultimately, a majority of the shards from the surface survey and topsoil were discarded in both areas U and W. In these layers, many baskets were fully discarded after weighing, reading, and counting, or only a selection was kept. The selections from the surface and topsoil commonly included 1–3 shards. In the natural fill below the topsoil, the selected shards were more numerous (3–14 shards), and they represent 25–90 % of the excavated items. The intensive retrieval of all rims started from deposits under the natural fill below the topsoil. This was also the point, at which excavators started sifting the excavated earth.

The situation is a healthy reminder of the potential flaws in one's memory; my recollection was that all rim parts were kept and analyzed from right below the topsoil. The selections from the uppermost layers are poorly related to the originally excavated ceramics, and biased towards the exotica and forms that could be identified typologically. The shards that could not be identified chronologically were more commonly discarded than the shards that were identified to a type and a time period. Therefore, the material is not representative of all excavated pottery. Throughout the stratigraphic sequence, all shards were discarded from the baskets that included only coarse ware body shards not considered diagnostic and not deriving from a context with restorable pottery. Small differences between the counts in the field readings and recorded items are due to two factors: first, the amount decreases as a result of some pieces being interpreted as belonging to the same vessel, either as they could be joined or in some cases by a strong similarity between shards from the same context. Second, the amount increases as there were shards in the paper bags for bones that I received later. In addition, a few plastic bags remained in the storage room in Israel, although they should have been brought to Helsinki to be analyzed, leaving 32 rim shards from area W unrecorded.

The amount of registered items from the intensively retrieved areas is much higher than in that of the other areas excavated. For the seasons 2003 and 2004 in area U, the amount of kept indicatives and the amount of items registered is the same. The deviation between these two figures in area U in 2005 and 2007 is at least partially due to the large amount of material that was restorable. In addition, the shards covering the oven L4287 in room L4301 were fully retained, even though most of them were body shards. The sub-area of N supervised by Valkama has less items registered. Though it was retrieved in an intensive way, I did not register the material fully except for a few loci, because the contexts could not be tied to the local phasing in area U and thus could not help in finding differences relating to stratigraphy.

Registered finds in Areas U and W	**U 2003**	*%*	**U 2004**	*%*	**U 2005, 2007**	*%*	**2007 (N)**	*%*	**W 2004**	*%*
selection kept	20	*17*	17	*10*	11	*4*	66	*46*	46	*28*
all diagnostics kept	72	*60*	119	*68*	56	*22*	56	*39*	84	*50*
all kept	3	*3*	1	*1*	169	*66*	5	*4*	4	*2*
all discarded	24	*20*	46	*26*	19	*7*	6	*5*	33	*20*
Unknown	-		-		1		6	*5*	-	
Baskets with pottery	**118**		**176**		**256**		**143**		**167**	
Nature of context for pottery baskets										
disturbed, e.g. topsoil	14		33		36		37		25	
colluvium	52		31		10		21		49	
fill on street	0		0		7		25		3	
destruction debris/stratified fill	48		68		148		-		63	
pottery concentration/whole vessel	3		31		20		56		23	
pit, installation or wall	1		13		35		4		4	
all collected baskets	**149**		**244**		**293**		**187**		**183**	
defined loci	**44**		**51**		**45**		**33**		**68**	
Pottery material										
Total weight of pottery	417.3		343.7*		319.3		325.3		714.7	
Total of counted rims	988		802		552		740		1824	
counted other diagnostics	247		217		448		510		304	
registered vessels/shards	**651**		**697**		**615**		**146**		**733**	
registered other ceramic finds	102		ca. 50		ca. 60		3		29	
registered stone objects	84		71		27		17		47	
Amount of kept diagnostic shards	651		697		826		888		765	

Fig. 4.7 Table of features relating to the contexts of the baskets and the material kept in areas U & W. *The total weight for season 2004 is too low, as weights for most pottery concentrations are missing.

Compared to the excavations by Fritz, the changes in the documentation practices within the KRP allow the reader to better asses the validity of the results. During the KRP, measuring and recording the weight of pottery was routine. In addition, the field readings were recorded in more detail: the shards considered as indicatives were counted and recorded according to their estimated period during the field reading. The preservation (if the shard was a rim, body, handle, or some other part) of the indicatives was included in the reading as well, so that one can separate how many rims there were in relation to other fragments considered indicative. The number of indicative items kept was also recorded, and thus one is able to deduce the number of discarded ones. The effect of the retrieval strategies within the KRP is clearest when comparing the amount of *registered* items, which is higher in the areas of intensive retrieval and can be regarded as representative (except for the uppermost mixed layers).

4.5 Second Selection: What is Included in the Pottery Analysis?

The following section addresses the process of second selection: deciding what material is to be registered in detail and analyzed further. As my source material I used the find cards from both projects, interviews for the Fritz era, and reflection upon my own experiences for the KRP. The kinds of details that were included in the recording forms is also relevant. It is time consuming to fill in a detailed recording sheet for every item. In Israel-Palestine, it has been a common practice to build the type definitions so that they include a large amount of detailed information, and a (major) part of the material can be recorded according to a type series only (Kenyon 1971: 275–276; Joukowsky 1980: 333). The material from the Iron Age layers that was kept from both projects is included in the typology (chapter 5). However, the material typologically dated to the Early and Middle Bronze Ages has been excluded from the typological descriptions in most cases.

4.5.1 Fritz 1994–2001

The second important point in the selection process is: when it was decided to make a find card (Appendix 4M–P) for an item. Find cards were not filled in for all items that were kept, numbered, and saved in cardboard boxes. This selection of registered items was already aiming at the publication (SM2014). The decision lay primarily with Fritz, but other people could affect the decision by presenting their arguments. The find cards included details of each selected item, and a drawing was usually attached to each card. The cards included a classification of functional classes but no explicit types. Color was recorded according to the Munsell Soil Color Charts, and the clay material was characterized macroscopically as to the included small and large grits, and their color and density, though without any given scale. The difficulty of being constant in the description of the grits was acknowledged by Anke Welzel, who recorded the finds in (1985 and) 1994–1999 (AW 2013). The recorded details on the find cards were planned to be included in the pottery plates of the final report. This method of recording the grits was (and still is) common in archaeological reports, and was also used in the first report of the Kinneret excavations (Fritz 1990).

There were altogether 741 find cards made for pottery vessels from the excavations of 1994–2001, which is approximately half of all the find cards (1489). The find cards include the context information and a description of the find, including an identification of the vessel class, color of the clay surface and core, observed inclusions, a mention of whether production was by hand or by wheel, and of possible surface treatments and decoration. A line drawing and a photograph should also have been attached to the card (Fritz 1985: 59; 1994: 61). Most of the cards have a drawing attached, while photographs are rare. Most of the cards for pottery items were made for well-preserved vessels (with approximately half of the profile or more preserved). In addition, 127 cards were made for clay discs that were reworked body shards, or bases of vessels used as stoppers or lids. Several (37) handles with painted decoration or incised or impressed (potter's) marks were registered (e.g. crossing stripes and thumb impressions). Interesting and rare vessel forms were selected, as well as vessel types that appeared at Tel Kinrot for the first time. Commonly occurring types were selected a few times in order to show that the type appeared in a certain stratum (SM2014). Nine small fragments considered to be imported wares from the Mediterranean, and two shards identified as chocolate-on-white ware, were registered as well. They were typologically dated to the Late Bronze Age, but derived from stratified Iron Age contexts or mixed layers close to the surface.

Stone objects were drawn in a considerable amount compared to ceramics. There were 326 ground stone objects drawn altogether, and ground stone objects represent 60 % of the find cards of 2001. A considerable part of the stone objects that were drawn were round working stones that show little variation in form (112 items). Natural stones with a hole drilled through, interpreted as net weights (58), were also drawn, being regarded as fully preserved objects.

4.5.2 KRP 2003–2008

A renewed form for recording finds was designed before the 2003 season. During the course of the work, some fields were added to the form in order to improve it. During the first excavation season of 2003 the form included 1) type of the vessel, 2) type of the rim, 3) material (clay), 4) preservation of the find, 5) diameter of the mouth, 6–8) color of the inner and outer surfaces and of the matrix, 9) hardness, and 10–15) two tempering materials (the main and a secondary), their amounts and the sizes of inclusions, 16–17) possible surface treatments, 18) decoration, 19–21) its colors, and 22) an estimated date (period). Functional elements were recorded when perceived, and the possibility to write a free description and to cite parallels from other sites was also included in the form. From the 2005 season on, I measured and recorded the thickness of the wall at the rim and below it as well, and during the 2007 season a field for traces of use was added. The database for registering the finds was first filled in during the field season, and afterwards the database was accessible over an internet connection for all partners, and I continued its use from Helsinki during the post-excavation analyses. The documentation lay-out for the finds is presented in Appendix 4O–P.

Informal selection in areas N, R and S

The assemblage from the Iron Age phases of the KRP excavations is structurally very similar to the assemblage from the Fritz excavations: most finds are well preserved, and in addition there is a selection of decorated body shards and handles. Reused pottery shards (stoppers, spindle whorls) were always registered and drawn and/or photographed. Also, stone objects were generally registered, often with a drawing or a photograph except for the 2008 season, for which most stone objects lack pictorial documentation.

Intensive retrieval in areas U, W and a part of N

There are 2830 registered items from the intensively retrieved areas U and W, and the intensively retrieved part of area N. For the material from areas U and N, I entered all registered pottery vessels and vessel fragments into a statistical program. However, for area W, I decided to leave the body shards, handles, and bases out of the material included in the statistical program. This was because the body shards kept were the result of an informal selection, and thus do not comprise a proper sample. However, I did include large fragments (ca. half of a profile or more preserved) even if they lacked a rim. In many statistical analyses I left the body shards out of the analyses, as many of the analyzed attributes related to the rim part and could not be measured from them. It was also generally difficult to identify body shards to a functional type. Therefore, the material from areas U and N includes many items that are unknown in their vessel type.

In the intensively retrieved areas, the pottery includes more items identified as belonging to the most common types, bowls and cooking pots, while the share of lamps and small containers is much lower than in the areas that followed an informal selection strategy (see Fig. 5.1 below). For example, 541 items were identified as bowls in the areas of intensive retrieval (25 %), while there were 110 registered bowls in areas of informal retrieval strategy (18 %). A similar phenomenon appears, when the numbers of registered cooking pots are compared between the areas of intensive vs. informal retrieval strategies. In the former, there were 540 cooking pots registered (25 %) versus 104 (17 %) in the latter. The difference is less prominent in case of kraters; they were more common in the assemblage of intensive retrieval with 296 items (14 %) than they were in the assemblage produced by the informal strategy, with 63 items (10 %). At the same time, the small closed vessels are far more common in the assemblage formed by the informal retrieval strategy, with 81 registered items (13 %) as opposed to 41 items in the assemblage of intensive retrieval (2 %). The difference is also considerable in regards to lamps: they were more frequent in the assemblage of informal retrieval strategy, with 29 items (5 %), than they were in the assemblage of intensive retrieval, with only 7 registered items (0.3 %). The informal selection portrays a higher proportion of small containers and lamps than existed in the original excavated assemblage. Small containers are fairly often decorated, and their small closed form also protects them from breakage. Therefore, they are relatively easy to identify even from body fragments. It seems that an informal retrieval strategy leads to an over-representation of small containers and lamps and an under-representation of bowls and cooking pots in the assemblage.

4.6 Publishing Pottery

The published articles can be divided into three levels of detail: 1) short notes on single campaigns published in periodicals and entries in encyclopedias; 2) the preliminary reports published as (peer-reviewed) research articles in periodicals, including a selection of finds and maps from the excavation as well as other research articles; 3) the final report then, should be both comprehensive and fluent. Fritz was well aware that the methods of excavation have a decisive effect on publishing, which vary in quality as well (1985: 63–65). Research articles may focus on specific themes or finds, while popular articles usually aim at a general picture (e.g. Fritz 2003; Münger et al. 2011). Research articles on the excavations on the acropolis were published in *Zeitschrift des Deutschen Palästina-Vereins (ZDPV)* (Fritz 1978, 1986a) and in *Tel Aviv* (Fritz 1993a). Short reports were published in several periodicals and encyclopedias (Fritz 1983; 1984; 1985a; 1985b; Fritz & Rösel 1986; Hübner 1987; 1988; Fritz 1989; 1992; 1993b; 1995). Popular articles were published in German (Hübner 1983; 1984; 1985; 1986; Fritz 1986) and in English (Fritz 1987a; 1987b). The final report included analyses of faunal remains (Ziegler & Boessneck 1990) and metal artefacts (Muhly et al. 1990) by specialists.

Research articles presenting the preliminary results of the excavations on the slope were published in *ZDPV* (Fritz & Vieweger 1996; Fritz & Münger 2002), in *Tel Aviv* (Fritz 1999), and in a congress volume (Fritz 2000). Short descriptions of the results were published in several journals and other media (Fritz & Vieweger 1997; 1999; Knauf 1998; Dietrich et al. 1998; Fritz & Knauf 1999; Münger 1999; Dietrich & Münger 2001; Knauf 2000; 2002; Fritz 2008). The article by Dietrich & Münger briefly discussed the practices of the fieldwork along with the results. Practical issues were also described in two articles in Finnish (Särkiö 1999; Särkiö & Valkama 2006). Popular articles were published in German (Fritz 1998; Fritz 2001). Several detailed articles appeared in a special volume of *Antike Welt* (e.g. Fritz 2003).

The publications of the KRP overlap with those of the project led by Fritz (e.g. Fassbeck 2008). Preliminary excavation reports and descriptions of the results have been published mainly by the directors of the project: Münger, Pakkala, and Zangenberg. However, other members of the excavation team have been involved in the publications as well. Several preliminary reports have been published (Pakkala et al. 2004; Zangenberg et al. 2005; Pakkala et al. 2006; 2008; Münger 2008; Münger et al. 2009). A short entry is included in the *Encyclopedia of the Bible and its Reception* (Münger 2012). Research articles have been published discussing specific themes or finds: a decorated chalice (Faßbeck 2008), scarabs and seals (Münger 2007; 2009), a shrine model (Nissinen & Münger 2009), an intra-mural burial (Münger 2012), and ethnicity (Münger 2013). Popular articles have been published in German (Zwickel 2003; Münger et al. 2006; Münger et al. 2007; Zwickel 2007; 2008) and in English (Münger et al. 2011). Various materials have also been studied in academic theses (Saarelainen 2007; Schmidt 2008; Grütter 2009; Thomsen 2011). The Tel Kinrot material has also been included in research articles on the chemical analysis of vessel content (Namdar et al. 2013; Gilboa & Namdar 2015), and on faunal remains (Weissbrod et al. 2014).

The preliminary report-articles focus on stratigraphy, architecture, and chronology. The role of pottery is chronological, combined with considerations concerning cultural contacts or the affinities of the inhabitants (Fritz 1999; Fritz & Münger 2002; Münger 2013). The strata are dated with the help of parallels from other sites, and the presence of specific wares or *Leitformen* like pithoi or imported ceramics, thought to have a fixed chronology (Fritz & Münger 2002: 10–11; 17–18). Fritz considered the nature of the habitation as a planned urban settlement in the Early Iron Age to indicate an affinity to the Bronze Age culture of Israel-Palestine (Fritz 2000: 508–509). In the articles where preliminary results were published, pottery was discussed after the architecture. The discussion included a short description of some vessels, and parallels cited from other sites such as Megiddo, Hazor, and Tel Qasile (Fritz 1999). In the article by Fritz & Münger (2002), the range of sites cited for parallels was larger, including Tel Dan, Shechem, Taanach, Beth Shean, Pella, Tell Keisan, Jokneʿam, and Tel Hadar. The parallels from stratified contexts at other sites served to establish dating. In the pottery typology (below), I add further sites from which I cite parallels. The typology includes material excavated during the Fritz excavations as well as during the KRP. I treat the assemblages from the two projects as one, because they derive from the same archaeological population. However, the statistical analyses (section 5.3) are based on the intensively retrieved material of the KRP excavations alone, because it is the statistically sound sub-set.

4.7 Summary

"We now have much more data" (SM 2014). There are 1489 registered items from the excavations of 1994–2001, and the database of the KRP excavations includes 5131 entries, which is more than three times the amount of earlier project. There are more collecting baskets with exact positions recorded from the KRP than from the Fritz excavations as well. Thus, the data is indeed recorded in more detail, especially when related to the sizes of the projects. The six seasons of excavations by the KRP were not a small project. Still, the excavated squares were less than half of those opened during the eight seasons directed by Fritz. The KRP excavations produced more detailed recordings of the field work, as well as of the artifacts and ecofacts found. The KRP produced a more detailed and consistent descriptions of earth features. As for the finds, there are more registered items and more details about them. In addition, the recording of the retrieval practice is more detailed. Studies of paleo-botany and faunal remains yield information on subsistence. The consistent analysis of soil samples was brought about by the KRP (SM2014), while zoological studies were already included in Fritz's work. These analyses reflect the growth of specialization within the team. The overall picture is more detailed and complex, which may be more realistic, however it may also pose challenges for interpretation. The systematic retrieval strategy followed in areas U and W allows statistical analyzes. These features show the influence of processual archaeology, with its emphasis on quantitative studies and the use of the natural sciences, broadening the framework from that of pure culture history.

Field work entails the observation and interpretation of a variety of features. One cannot know what will come up next, and what will turn out to be significant. This presents a challenge for the comprehensive recording and interpretation of the excavated entity. The documentation system thus needs to be flexible and enable changes and expansions. At the same time, it should help the excavation team to create consistent descriptions that are easy to follow. The interpreter has to compose a story that is faithful to the excavated materials by presenting them in a comprehensive way. At the same time, she/he has to be loyal to the audience: to try to bridge gaps in order to create a picture that makes sense. This interpretative task is not necessarily made easier by a very detailed level of recording. Rather, the abundance of detail can obscure any emerging pattern and actually become an obstacle for achieving an overall picture of the material and the studied phenomenon. Thus, an exact and detailed system of recording information can also pose a challenge for the interpreter. Sensible interpretation requires a guiding principle that is relevant, and enables patterns in the material to emerge. It requires ideas about what details might be important. Such features, in the case of pottery studies, have traditionally been related to size, form, color, and ware. Based on my experience in archaeological field work, I also regarded such features as important when I started my work in the Kinneret Regional Project.

Chapter 5 Presenting the Pottery – Description and Analysis

5.1 Introduction to the Early Iron Age Tel Kinrot Typology

Why make a typology in the first place?

Typology as a method of classifying artifacts in archaeology was first applied on a large scale in Scandinavia; it was used for primarily chronological purposes (Montelius 1884; 1899; Müller 1899; Furumark 1941: 3–6). It was based on evolutionary thinking (Åberg 1928; Furumark 1941: 3). Typological analysis, working on the assumption that similar forms are approximately contemporary, has been a central tenet of the archaeology of Israel-Palestine from the late 19th century on, beginning with Sir Finders Petrie (Petrie 1904: 125; Davis 2004: 29–30) and continuing with William F. Albright (Albright 1934; Davis 2004: 66–76) and Kathleen Kenyon (Kenyon 1961: 153; 1979: 15), and is still a strong force in the field today (e.g. Mazar 2005).

In the following typological description of the Tel Kinrot pottery, I have aimed at a structured depiction of the excavated material: its date, nature, and position in the geographic and cultural setting of Israel-Palestine. In order to make comparative work easier for readers, the report follows the pattern of most pottery reports. It presents groups proceeding from open to closed forms, and ends with a chapter for various vessels that do not fit any of the defined classes. A list of distributions at Tel Kinrot and a list of parallels from literature follow the type descriptions. The typology (chapter 5.2) is planned to be a part of the site report, while the contexts will appear as separate chapters. Such fragmentation is typical for archaeological reports (Jones 2002: 46).

Constructing a typology requires that the researcher take on an active role in the process – the artifacts themselves are passive objects, and the types are based on the experience and evaluation of the scholar touching and looking at them physically, and visually as drawings and photographs, and reading their descriptions in find cards. The researcher also needs to decide what will be sorted: the boundaries of the material that will be included. Typologies have been criticized of artificial rigidity of classes and their presentation as independent of the observer (Shanks & Tilley 1987: 117; Pfälzner 1995: 10; Langin-Hooper 2011: 40–59; 2013; Gnecco & Langebaeck 2014: v–vi). However, archaeology as a study of the material remains of past societies cannot do without classifications. Human perception is profoundly dependent on grouping and creating types, and archaeology is not an exception (Bowker & Star 1999; see also Rice 1987: 274–288; Sinopoli 1991: 49–56).

A typology is a scholarly construction, and should not be regarded as a *re*-construction of the ancient potter's or consumer's categories. My aim has been to create types that are as homogeneous as possible within the types, with explicit and clear boundaries between the types. Sharp boundaries enable an easy distinction of one type from another while sorting. The clarity aspired to for the typology stands in opposition to the nuances of the studied material. In order to 'do justice' to these nuances, I have also included a description of the variety within at least some features of the vessels that I grouped together in a type. I began the Tel Kinrot typology building as an *intuitive* grouping of objects. By intuition I mean here a quick assessing of patterning in the material. I do not mean intuitive as something opposed to the rational, but rather as a thinking mode that precedes the rational, rule governed, and explicit argumentation (see e.g. Witteman et al. 2009: 39). After the initial groupings, I made the explicit type definitions based on the items that I had grouped together. I then used these definitions, together with the earlier grouped items, as guidelines for sorting new material (for sorting and classification, see e.g. Adams & Adams 1991; Sinopoli 1991: 49–50). I do not believe in grasping for the mental template or *ideal pot* of the ancient potter (following Maier 2007: 242, Mullins 2007: 391; contra Panitz-Cohen 2009: 219). Consistent patterns in material culture that coincide with chronology or geographic regions may well have been irrelevant for the contemporary people, yet they are still informative for archaeologists.

As types are a means of communication, I did not consider it a drawback that I built the typology of the Tel Kinrot pottery on the well-established tradition of archaeology in Israel-Palestine. On the contrary, using established terminology increases the understandability of the presentation. According to Mazar and Panitz-Cohen, establishing "a type series of some sort enables more meaningful study of the diachronic and synchronic aspects of pottery development, so that the advantages outweigh the disadvantages of this system" (2001: 12). In the beginning of the work I did not consider typology a problematic enterprise at all – it was the normal way of working with ceramics. I saw explicit types as an improvement over the artifact studies of the old tradition and their implicit types, where vessels were grouped together and labelled and descriptions were written for individual vessels. The most important goal was to create a typology that 'works' with the material from Tel Kinrot. A practical measure for the success of a typology is the (desirably small) amount of items that fall between the defined types. I have kept this number as small as possible without creating many subtypes, which easily make a typology tangled – in practice, it may often lead to describing a single vessel as a type (see section 2.5 above).

The types are different in their easiness of recognition. There are some types that are easy to distinguish (e.g. the carinated Krater KR04, or the Phoenician style jug JG04, see below). These types have distinctive morphology, and the vessels show a great similarity to each other. However, in many cases it is difficult to differentiate between two (or more) close types. The groups differ from each other in their inner consistency: cooking pots and storage vessels seemed to have a few types only, and these types were uniform and easy to classify. This probably relates to their functions. On the other hand, kraters (a form combining features of storage jars, cooking pots, and bowls), bowls, and small containers were far more heterogeneous groups, and I had much more difficulty creating clear and distinguishable types. Comparable difficulties have been expressed by authors of pottery typologies (e.g. Mazar 1985; Mazar & Panitz-Cohen 2001).

My starting point at Tel Kinrot

When I started the typological work for the KRP in 2003, I used earlier typologies as my guide in order to identify the vessel type for shards. I used Ruth Amiran's (1969) standard typology of pottery in Israel-Palestine as a basic reference, and I was familiar with the published pottery from Tel Kinrot (Fritz 1990) and two major sites in the Northern Jordan Valley, Tel Hazor (e.g. Yadin 1958; 1960; ed. Ben-Tor 1989 and 1997) and Tel Dan (e.g. Biran 1989a, 1989b; 1994). For Tel Dan, I also used the unpublished dissertation of David Ilan (1999). The classifications I ended up with have thus been influenced by other excavation reports, and their pottery presentations as well. The typologies that I used most often were those of Tel Qasile (Mazar 1985), the renewed excavations of Tel Beth Shean (Mazar 2006, Maier 2007, Mullins 2007, Panitz-Cohen 2009), Tel Yoqneʿam (Zarzecki-Peleg et al. 2005), Megiddo (Arie 2006), Timnah (Mazar & Panitz-Cohen 2001), and Tel Dan (Ilan 1999). The most helpful of these have been the reports from Tel Beth-Shean, since they have avoided using an overwhelming amount of types and sub-types, and were in many cases explicit in their type definitions. The report on the Iron Age pottery from Tel Beth Shean was especially useful, because the material is often similar to that of Tel Kinrot (Panitz-Cohen 2009).

The typology for the pottery from the 1980's Tel Kinrot excavations (Hübner 1990; Fritz 1990; section 3.4 above) was implicit, and followed in this sense the example of the large-scale excavations at Megiddo by the University of Chicago and at Hazor by Yadin. The finds were identified as belonging to broad groups of bowls, chalices, cooking pots, storage jars, pithoi, jugs, pyxides, flasks, or lamps. Further sub-divisions were avoided, and parallels were given for single vessels described in detail. The groups were based on vessel forms, with a certain association with assumed functions such as cooking, storage, and other household activities.

During the excavations by Fritz in 1994–2001, some distinctive wares were classified on find cards. These wares were distinctive ceramics, considered to be imported items produced somewhere else, such as Tell el-Yahud ware (from the Middle Bronze Age), shards of Mycenaean, Cypriot (so called milk-bowls or chocolate-on-white-ware, both Late Bronze Age), or Phoenician (decorated jug, Early Iron Age) imported vessels, and Abydos-ware and grain-washed ware (from the Early Bronze Age). There was no petrographic study used for such inferences, but the interpretations rest on the macroscopic evaluation of an experienced archaeologist, Volkmar Fritz himself.

In the earlier report, as well as in the find cards of the 1990's, the pottery that had painted decoration in red and black (or dark brown) was sometimes labelled bichrome ware, but this designation in the find cards was used somewhat inconsistently. The bichrome style was identified only once in the preliminary plates for Kinneret II for a shard (6119/2), and only once for a jug in an article published in 1998 (Fritz 1998: 438, Fig. 11). The style was defined by Ruth Amiran in 1969, and further discussed by Amihai Mazar (1985), Ayelet Gilboa (1998, 1999), and Gilboa & Ilan Sharon (2003). Bichrome decoration is a style considered of Phoenician origin, typical for Iron Age I (Gilboa 1998; 1999). The style comprises rounded jugs with a high neck and rounded base (sometimes a ring base), and one bowl form, decorated in red and black with rather settled patterns of mainly concentric circles, and in jugs also other patterns. Thus, not all pottery decorated in black and red was included, but the borders of the definition were not detailed by Gilboa. In the find cards from Tel Kinrot, several vessels that could have been defined as bichrome style, according to the widely used definition by Amiran, were not identified as such. However, the term was not defined, and it remains unclear if this was on purpose or a sign of the publication process still being under construction. As there is no commonly accepted definition for the term ‘bichrome,’ I decided to avoid the term and describe the decoration colors and patterns separately, as they would turn up during sorting. When writing the descriptions of the pottery types I also decided to refrain from the use of the term bichrome, as the patterns painted in red and black did not seem to follow such fixed patterning according to the arrangement and width of the lines as suggested by Gilboa.

When I started as the registrar in the KRP I had experience of two archaeological digs. I completed my first field school as a volunteer in 1999 at Tel Kinrot, as an undergraduate student. These excavations already provided me with an impression that ceramics played an important role during the excavations. During the summers of 2000 and 2001 I worked at Tall Mozan in North-Eastern Syria in a team analyzing pottery. These seasons were formative for my approach in pottery studies. At Tall Mozan, we counted all shards and analyzed all rim parts and decorated shards in detail, with over 20 features including forming technique, colors, decoration, surface treatment, use wear, and rim type (Schmidt 2011; 2013; for a closely similar observation set, see Pfälzner 1995: 10–12). The pottery at Tall Mozan was mainly from the Middle Bronze Age (Dohmann-Pfälzner & Pfälzner 2002: 153–156). When I joined the Tel Kinrot excavations in 2002, I wished to continue working with analyzing all rims, which I considered would make the assemblage representative of all excavated ceramics. I was convinced that intuitive selection would lead to a biased collection that would not enable trustworthy results (similarly Pfälzner 1995: 5–7). The features discussed in the literature, as well as my experience at Tall Mozan, affected my decisions about the details that I chose to record. I focused on details of the rim part, and the vessel form as far as it could be recognized. In addition, the reports I had used included descriptions of the clay material, the colors of the surface and possible decoration, and sometimes a description of the walls as thin or thick (e.g. Mazar 1985: 42; Epstein & Dothan 1989: 231, 249), so that I also thought that thickness was an important feature. However, I wanted to have a clearer and more ‘objective’ measure for the thickness, and decided to measure it with a scale of 0.1 millimeters.

Creating types

Guided by the literature, I set the emphasis for the type definitions of the Tel Kinrot ceramics on morphology, and in the case of cooking pots also on ware (see below). The system is hierarchic, with functional categories (groups such as bowls, jars or jugs) further divided into types (different “kinds” of bowls), and in many cases further into sub-types. I defined the major categories and types in ways comparable with other reports, such as those of Megiddo IV (Arie 2006) or Tel Beth Shean III (Panitz-Cohen 2009). In addition, I needed a class for the objects not further definable. Feeling uneasy with creating a complex taxonomy with many sub-types, I decided to create a typology for rims separately, so that the variations of the rim form (rim types) could be recorded without introducing sub-types. I assumed that similar rim forms could occur on different vessel groups, and that this might be chronologically significant.

I wished to create homogeneous types with clear boundaries between them. The clarity, however, was artificial to some extent. The real classified items were always more or less well apt to the description that was made on the basis of the first artefacts studied. The *real* material to be sorted is always more fluid, and the types that serve as mental categories for the sorting mind are artificial constructions imposed on an unwilling object. The process is recursive: 1) inspecting the material and creating the first, tentative groups; 2) describing the groups formed; 3) sorting new material according to the descriptions; 4) creating additional types when needed; 5) trying to evaluate the uniformity of each type and re-considering some designations in order to achieve as uniform groups as possible; and 6) editing the descriptions according to the material sorted. Thus the process goes back and forth between the real items and the abstract types.

In practice, the types were constructed in several stages. I formed the first, tentative groups with the help of line-drawings I had at my disposal from the excavation seasons of 1994–2001. These drawings presented mainly well-preserved vessels. They were a helpful tool for identifying fragmentary material (the majority of the pottery from areas U and W excavated 2003–2008 consisted of shards). The drawn material from the excavation seasons of 1994–2001 consisted mainly of well-preserved profiles, supplemented by selected rim shards and decorated shards. The first step of the work can be described as grouping together objects, and this is to a large extent an intuitive process. After the first groups were created in this way, I labelled and defined the groups according to their joint features. Thus the groups became types. I supplemented this preliminary typology during the field season while sorting the ceramic material – the real vessels and fragments – in August 2003. The objects found during the recording were then assigned to a type, or when they did not fit any existing type, I created a new type. Thus, some vessel and rim types were added during the sorting process. After the first season in 2003, I had the opportunity to study the material excavated during 1994–2001, over two weeks in December 2003, making notes about the forming technique, inclusions of the clay, size related attributes (rim diameter, full height, base width), and the state of preservation of the items, which is not always evident from the drawings. During April 2004 I stayed three weeks in Jerusalem going through the material at that time stored in the German Institute of the Archaeology of the Holy Land. This time I added details to my notes from the first visit, and packed the material in order for it to be sent to the Israel Antiquities Authority (IAA). During the excavation seasons of 2004–2008 I still added types if an item did not fit the formulated categories, but as the process progressed it became rarer to face such a need.

During the sorting process I was inclined to create new types rather quickly if a shard did not fit any of the existing types. This was for the practical reason that it is easier to combine groups later during the analyses than to separate them. Thus, the type forming process was flexible. I regarded this as desirable, since more material was still going to be accumulated. However, flexibility creates a problem of ‘moving’ types. By this I mean a situation where the first, tentative types were created from the material that was at my disposal already in 2002, but the material that was later accumulated changed the types: both as to what could be identified as belonging to the original types, and the amount of types alltogether. The set of defined pottery types in the beginning was not the same as the set of types defined at the end of the process. As new material was sorted and items were found that did not fit the first types, I created new types. The decision to create a new type was purely intuitive, as I had no criteria for that – which appears to be common (Sorensen 2015: 90). The items that were sorted at the end of the process thus had a different set of types with different type-definitions to be assigned upon than the items registered during the first seasons of my work. The items that were not close to 'the ideal specimen' of any of the types created in the beginning of the type formation process might have been classified to another type if they were sorted later in the process. In order to diminish this drawback of 'moving types', I checked a selection of items sorted during the first excavation season after the excavations were closed. In June 2010 I checked and photographed ceramics from 38 loci of areas U and W, altogether including 1247 pottery items. I selected the loci so that they were of stratigraphic relevance, and therefore more important for interpreting the site's history. I made some corrections, but for me the amount of errant shards was surprisingly low. However, I at this point I did not document the corrections, and now cannot recall the exact number of those corrections. In October 2013 I still checked five loci (altogether 149 shards). This time I did not change any of the classifications.

I started the typology building for the Tel Kinrot pottery material within the culture-historical setting. Even though I think the culture-historical framework has been too dominant in Israel-Palestine, I classify myself into the category of culture-historians. My initial interest was in looking for minor changes reflecting chronology, and in connections with similar artifacts from other sites in the region. I wished to define time dependent changes *within* vessel types and between the frequencies of the types, not only presence/absence data. Tracking differences that one could attribute to chronological factors meant that one should compare the fragments of the same vessel types in different strata to each other. In practice, one has to divide the material into groups according to both strata and vessel type for such analyses. Therefore, it is possible to reach statistically significant results for frequently occurring vessel groups, but not for types that include few items, as the differences can be the result of random differences. In addition, the contexts varied as to their stratigraphic clarity, and to what degree the ceramics from each context could be considered to be contemporaneous with each other. The material from different contexts could not be used in a uniform way for the initial chronological purposes, due to the mixing of the material at a multi-period site and the different uncorrelated local stratigraphies in the excavation areas.

Adjusting the recording sheet & data collection

In the Fritz project an explicit typology – a detailed differentiation between different kinds of jars and bowls – was not necessary, as all the vessels that were registered on find cards were also drawn. The registration was already aiming at the publication (SM 2014). It was clear from the beginning that the information was not increased by simply keeping more material: one also has to study them. While the amount of shards kept was increased, it was necessary to insert a more refined typology and detailed recording, as not all of the material would be drawn and it should still be possible to draw inferences upon the material. My original *purpose* in data collecting was related to chronological interest: to find changes that could be interpreted in terms of time and cultural relationships at Tel Kinrot and its surrounding region.

After having created the first, rather intuitive groups, I was able to decide which features to focus on. Because the sorted material was mainly fragmentary, I preferred to include features that could also be observed on fragments: attributes present on the rim part (rim form, width of the opening), possible surface treatments (burnish, slip, or painted decoration), and characteristics of the ware (tempering materials, hardness, and colors). The process was adjusted during the work by adding some features in the beginning of the 2004 field season (the thickness of points at the rim and below) and again in 2007 (traces of use). These variables were partially filled in (during 2010) for the material retrieved in 2003, leaving ca. 50 items without thickness measurements and most recorded shards without a systematic recording of use-wear.

I established a separate typology for rim forms, as I regarded rim variation as an important aspect of typological study and a probable source of chronological differences. Rim forms are often of special interest in the chronologically oriented pottery reports from Israel-Palestine. The rim form was recorded as a separate feature for two reasons. Firstly, a minor variation in rim forms was regarded a possible way for reaching fine-grained chronological distinctions (e.g. Maier 2007: 242). Secondly, it was clear that similar rim forms sometimes occur in different vessel types (and even in different vessel classes). If it is assumed that similar rim forms are contemporary, the trends can be better observed if several vessel types can be used at the same time when comparing the local phases. Oftentimes, the comparisons between the popularity of a certain rim form in different stratigraphic phases are only carried out from within the same vessel group. However, for many vessel groups the dataset is too small to draw such conclusions.

The rim types did not prove to be very helpful for chronological distinctions at Tel Kinrot. The factors behind this are at least twofold. First, there is a lack of site-wide stratigraphy. Each excavation area has a local stratigraphy, and their correlation is difficult and tentative at best. Some areas have more local phases (W, K) than others (N, S), and their phasing does not seem to be synchronous, but rather to present a “vivid and dynamic building processes” (Münger 2005: 77, footnote 3). In only two excavation areas was the pottery retrieved systematically, so as to form a representative sample that could be used in statistical studies. Second, it seems that the time scale may be too short to show patterned change. Stefan Münger has suggested a time period of only little more than a century for the Iron Age habitation, beginning during Iron Age IB in the 11th century (2013: 150). Even if one would suppose a slightly earlier beginning for the Iron Age habitation, the time scale remains at around 200 years.

I transferred the recorded details into statistical packages (I have used three software programs: SPSS, Survo, and R). The resultant tables of data formed a *data set* of the recorded features, called *attributes,* relating to the preparation of the clay (tempering materials, the amount and size of particles estimated macroscopically; color of surfaces and freshly cut matrix, and hardness), the form of the vessel (shape; thickness at different points, and decoration), and its function (shape, diameter, thickness at different points). Form and function relate to each other, and most of the features relate to both. I have mainly focused on rim shards. As the result of the intensive retrieval strategy of pottery in areas U and W, I made a corpus of ceramic items consisting of a total of ca. 2600 ceramic finds, out of which 2110 were rim shards, and ca. 60–70 vessels having a whole or almost whole profile preserved. I selected the attributes with the aim of gaining insight into changes taking place in techniques (tempering, firing – related to facilities and apt to stay constant for long periods) and style (related to individual potters and more easily affected quickly).

I decided to rely on size measurements foremost for the rim part, since it is the most readily available part. I estimated the diameter of the rim using a radius sheet of round semicircles, against which I set the rim part. If no warping or bending was observed, I assumed a symmetric shape. The diameter is measured from the interior side, if not otherwise stated. I preferred the inner side as it was more straightforward to observe, and it has been demonstrated that simple measurements tend to be more consistent and accurate (Fish 1978: 87–88; Gnaden & Holdaway 2000: 743–745). In the case of wholly preserved rims, I measured the (interior) diameter using a mechanical slide caliper. Rim thickness was measured with a slide caliper, from the maximum and minimum point of thickness. In addition, the wall thickness below the rim was similarly measured. The points were measured from such fixed places in order to minimize the observer dependent variation. Wall thickness is to large degree a function of the size of the vessel, big vessels having thick walls. It also varies quite much in the same vessel, the upper part being usually thinner. For example, the neck parts of storage jars can be 3 mm thick, while the wall thickness may reach 15 mm near the base. Heights or maximum diameters at the body have been measured from the outside. Whenever possible, the measurements have been taken from the vessels themselves. For some closed vessels and kraters excavated in 1994–1999 the measurements rely on drawings. This forcefully adds one possible source of error.

Ceramics are usually tempered by adding some materials to the clay while preparing the clay in the early stages of the potter's *chaîne operatoire*. The properties of the materials modify workability, drying characteristics, firing behavior, and the final characteristics of the pottery. Mineral tempers are the most common in archaeological contexts in general (Rice 1987: 406–408). This also seems to be the case for the vast majority of the Iron Age vessels from Tel Kinrot. In ethnographic investigations on pottery production, both clays and tempers are usually acquired from distances within a few kilometres (Arnold 1985: 32–46). The geological context of Tel Kinrot includes limestone, conglomerates, basaltic formations, and alluvial soils (Orni & Efrat 1966: 51–52; Sneh et al. 1998; Sneh 2008).

While a petrographic study or a chemical analysis of the clay has not been available, I have described the ceramic mass macroscopically and separately recorded the identified material, particle size, and the amount of particles. I decided not to form fabric groups in the beginning. Such groups, if formed in the early stage of a study, can create artificial groups and obscure variations inside possible 'tempering recipes' that are often specific (e.g. Arnold 1985; Rice 1987: 121). The interpretations of the tempers are based on observations made from the fresh cut vessel matrix. The same minerals may also appear inherently in clay, and the distinction is difficult. An angular form of particles is often interpreted as a sign of the particle being added temper, though it is not an absolute means for differentiation (Rice 1987: 409–411). At Tel Kinrot, there are sets of particles that constantly occur in the ceramics in patterned ways, and that have been interpreted as temper. The proportions of the tempering particles have been estimated on five scales: (almost) no grits/lack of temper (<1 %), very little (1–2 %), little (>2–5 %), medium (>5–10 %), and much temper (>10 %). Munsell Soil Color Charts were used for estimating the proportions of the inclusions. The size of the particles has been recorded in three categories: small (diameter < 0.3 mm), medium (0.3–0.9 mm), and coarse (>1 mm).

Angular, hard, shiny, and white–greyish particles have been interpreted as quartz. Soft, white, and rounded particles have been interpreted as chalk (limestone), and small, dark, or black rounded particles as basalt. Small, often elongated voids recognized in the fabric have been interpreted as traces of organic temper, burnt off during the firing of the pottery (Kalsbeek 1969: 78). The basalt particles are small (small and medium), and the softer chalk particles are often of a larger size (medium to coarse). Basalt is the most common temper at Tel Kinrot, used commonly along with chalk. These two stones are the most easily available at the site. The macroscopic uniformity in tempering the clay is remarkable. Quartz is mainly present in cooking wares. They also have a darker and redder color compared with other vessel classes.

Colors were recorded for the inner and outer surfaces, and for the core from a fresh cut section with the Munsell Color Charts (MSCC edition 2000). The color of the ceramic is the result of many factors, like the chemical composition of the clay, the firing conditions, and the vessel use (Rice 1987: 331–345). The colors of most vessel types mainly present yellowish and reddish shades of brown (MSCC rows 5–7 and columns 4 and 6 on pages 2.5YR, 5YR and 7.5YR), while the cooking pots are darker.

I chose the attributes regarded as definitive for type definitions so that they could be observed on a majority of finds. This meant focusing on the features of the width of the diameter, rim form, color, and ware. These features were also recorded in detail: diameter of the rim in millimeters; rim form with a detailed typology (including the direction of the rim part as compared to the wall below the rim and the form of the rim part); thickness of the rim part at its maximum and minimum in 0.1 millimeter intervals; colors of the inner and outer surfaces and core from a fresh cut, with the help of the Munsell Soil Color Chart; ware description with two or three tempering materials observed from the fresh cut, and their amount and particle size recorded in ordinal scale. I made most of the recordings myself. In addition, Emilia Tapiola recorded shard material in Helsinki during the winter of 2003 and Inga Müller recorded material during the field season of 2008. In addition, I sometimes had assistant students for short periods during the field work. With the assisting students, I generally checked their recordings, especially in the beginning of their work. The interconnections between the different variables appear in Fig. 2.6 as a measurement model. The constant nature of these interactions can to some extent be confirmed by factor analysis (see section 5.4).

It is difficult to know in the beginning which details will turn out to be significant (see Mazar & Panitz-Cohen 2001: 11). At this point one has to decide what kind of features to observe, what kind of measurements to take, and on what scale of precision. The decisions necessitate a pre-understanding of the features that should be considered meaningful and worthwhile to study. These inevitable decisions will restrict and determine the possible differences that will be found in the material. In the case of pottery studies in Israel-Palestine, the inherited wisdom meant acquaintance with different and often blurred pottery types and descriptions, which seemed to be of an intuitive nature (e.g. the excavation reports from Hazor, Kinneret I edited by Fritz 1990, and the general book by Ruth Amiran 1969). As I felt uncomfortable with the intuitive nature of typologies, I turned to statistical tools in order to make the types more objective and consistent. Indeed, I was able to evaluate the consistency of type definitions in use and also to see which types and vessel groups were close to each other in statistical classification using the recorded variables as the criteria for classification. However, I did not reach the desired level of objectivity by using statistics. Statistics can be used in a manipulative way, and the need for interpretation when reading the statistical results is crucial. Statistically significant results can be archaeologically meaningless. The heuristic nature of statistical tools became apparent, as well as the need to be sensitive to the archaeological material worked upon when using statistical tools.

In a later stage of the typology writing, I tabulated a set of different recorded features for all of the registered items, in order to observe the consistency of the different variables of each type and to identify items that were somehow different or anomalous. I then took a closer look at the identified anomalies, sometimes resulting in a re-assignment to another type. In practice, this has meant looking at a graph and closely reading the tabulated features of the vessels related to type formation: rim form, body shape, overall size (when possible, but more often rim diameter), wall-thickness, and tempering materials. Defining any item as one certain type sometimes required compromises. If a vessel – or more commonly a fragment of one - fits one type as to its rim form and possible decoration, but another as to its wall thickness and tempering materials, its attribution to one type or the other was to some extent arbitrary. Such cases were often sorted several times into various types, in order to see which categorization resulted in the best solution for the whole classification. Sometimes I created a new subtype as a result of this process. This has meant some tolerance for inconsistency of features, while making decisions between type assignments. There are always items that lie in a gray zone between the defined types. Groups as well as types differ as to their uniformity, and I have noted this in the description of each group. I have tried to limit the number of sub-types in order to keep the presentation comprehensible.

Functions of the vessels

There are some interesting and important issues that fall beyond the scope of the present work, but nevertheless deserve a short comment. These are: the functions of the vessels, the production of the pottery, and standardization. This work focuses on the formal description of the material. Vessel functions, though an interesting issue, will be touched upon only briefly and sporadically. There are three different sources for inferring vessel functions: 1) ancient sources, including texts and pictorial representations, e.g. wall paintings or decorated pottery; 2) traces of use, studied from soot, scraping, notches, or residue analyses; and 3) the form and material of the vessels. Residue analysis can reveal what has been inside of a vessel, as most contents leave distinctive chemical traces. Such an analysis has been carried out by Dr. Dvora Namdar on two jugs and one flask from Tel Kinrot (see below). The residues are best preserved on closed vessels found intact, restricting the possible vessel types. Residue analysis requires sampling and laboratory facilities, limiting its use on a large scale, and thus it may be used to provide exact information on only a few items. Many macroscopic observations of traces of use are prone to various interpretations. Blackened spots or soot identified by the naked eye alone can imply a contact with fire that indicates a function related to (for instance) cooking, lightning, or incense burning. However, contact with fire and other reasons for color changes may also occur during deposition. Macroscopic observations thus provide less precise information, but is available on the masses of vessels and do not require specific equipment.

The restriction of ancient written or pictorial sources is that they are scarce, especially during the Early Iron Age in Israel-Palestine. Inscriptions appear on some storage vessels, mostly from Iron Age II and later. There is a storage jar handle from Tel Kinrot with an inscribed Paleo-Hebrew letter ḥet, dated to the 8th century BC based on writing style (Särkiö 2006: 208–209). The letter ḥet probably indicates that the content of the jar was wheat, as has been suggested for a similar inscription at Arad (Särkiö 2006: 210; Aharoni 1981). Pictorial evidence appears in Egyptian tomb reliefs, on decorated vessels, in wall paintings, and engraved objects, such as the famous Megiddo ivories (e.g. Yasur-Landau 2005, Ziffer 2005). These representations are informative, but rare and restricted to some types of vessels. The vessel forms and materials can be used to draw conclusions concerning probable uses, and these aspects are embedded in the typology. Ethnographic parallels can also be used, especially from the late 18th or early 19th centuries CE in Palestine. However, they are not direct parallels, since the cultural distance between the late second–early first millennium BCE and the late second millennium CE is huge. Still, the early ethnographies by Einsler (1914), Dalman (e.g. 1935; 1942), and Granqvist (1931; 1935; 1981) include precious information, as well as some early excavation reports (e.g. McCown 1947: Pls. 91.4; 94.4; 100.5).

The assemblage of the Early Iron Age pottery at Tel Kinrot represents common household pottery. The vessels can be interpreted in terms of storage, transfer, processing, and serving of daily supplies, as is usual for archaeological and ethnographic ceramics (Mills 1999: 100). The most common vessels are jars, cooking pots, and various kinds of bowls (Figs. 5.1–2). Functional assumptions are associated with the definition of vessel types, beginning with the labels such as *cooking* pots, *storage* jars, and lamps. It can be assumed that there also were vessel types for the ancient producers and consumers, but their definitions most likely were different from those of the modern scholar. Folk classifications are functional and fluid (Rice 1987: 278–281; David & Kramer 2001: 158–160). This is also the case in Neo-Assyrian texts, where vessels are defined as containers for certain foods (Gaspa 2007: 147–166).

The construction of a vessel depends on the motor habits of the artisan, and is not necessarily conscious (Arnold 1985: 7–8). However, it has been attested in ethnographic studies that standardization is a deliberate outcome expected by the consumers and best achieved by experienced potters, and that artisans that are able to produce very similar vessels are regarded as skillful (Longacre 1999: 53; Mills 1999: 109). Despite certain standardization that results in the homogeneity of pottery-shapes and surface treatments, there is regional diversity between various production centers. Many details in traditional Cypriote ceramics – e.g. in clays, vessel repertoire, and decoration – could be assigned to a certain village, or in some cases even to a single potter (London 1989b: 226). However, there is some unintentional variation in all hand-made pottery, especially in the details of rim forms (Miller 1982: 42). Two factors are especially crucial for *systematic* changes pottery: the chronology and locality, both related to the production community and its clientele (London 1989b: 227–228).

A 'standard' refers to a norm, convention, or requirement of almost any entity. In the study of material culture, standardization refers to homogeneity of artifacts and is connected to a specialized mode of production (Blackman et al. 1993: 60–61, with references). The term is a relative concept, and a high or low level of standardization is a matter of consideration between at least two assemblages of artifacts. The level of allowed variation for mass-produced items may vary from one type of vessel to another, depending on the vessels' functions. The level of homogeneity also varies between different vessel groups during the same period, even in the case where all the material would have been produced by specialists. At Tel Kinrot, the bowls, kraters, and jugs are groups that show a high level of variation, while the storage jars present few homogeneous types – or thus it seems to me as a modern scholar working on classifying the material.

Standardization is most commonly studied with metric indexes, foremost related to size, while important variables often neglected are the manufacturing techniques, used clays, and added tempers (Costin 1991: 35; Blackman et al. 1993: 61). Standard measurements existed in the Ancient Near East, and have been studied from textual evidence (Powell 1992). The texts reflect a special case of standardization, i.e. an official, administrative standard measure for purposes like tax collection. The distribution of such standard containers relate to the governed geographic area. Standards for certain containers are attested in Greek (Docter 1988–1990: 145–146), Egyptian (Imhausen 2007: 37), Neo-Assyrian (Gaspa 2007), and Mesopotamian sources (Gelb 1982). There are hints of standard measures in Judah during the Late Iron Age, but these standards are not necessarily exact in a modern sense (Kletter 2009, 1998; Powell 1992). The similarity of containers could also stem from a tradition of making certain kinds of vessels for certain kinds of uses, allowing some fluctuation according to their volume (contra Zapassky, Finkelstein & Benenson 2006, 2009).

Quantification

Of the assemblage of ceramics that were retrieved with an intensive retrieval strategy, the collected data set comprises ceramic material (mainly shards) from two areas of excavation (U & W) and a part of area N. The material is collected in one data set only, but can easily be split according to the areas when, for example, features between different local strata should be compared. The shards were assigned to a vessel type through comparisons with suppositions of full vessel forms, created with the help of material excavated earlier at the same site (1994–2001) and from traditional literature that has focused on well preserved forms (e.g. Amiran 1969).

The Tel Kinrot excavations have been a process spanning two scholarly generations. The material from the excavations directed by Fritz (1994–2001) includes selected material mainly from stratified contexts. The analyzed and illustrated vessels or vessel fragments have been selected so that they are of types that are recognizable and have a distinctive chronological range. Even though a major part of all retrieved rim fragments from Fritz's campaigns were retained, numbered, and stored, they were not counted or analyzed in detail (Welzel, pers. comm.). During the excavations of the Kinneret Regional Project (KRP, 2003–2008) a similar principle was adopted for the excavation areas which continued from Fritz's excavations. The process was changed, however, for the newly opened excavation areas U and W. In these two areas all the rim fragments were counted and analyzed. The intensively collected areas contributed a major part (ca. 70 %) of the pottery retrieved during the excavations of the KRP. Therefore, the percentages of the vessel groups and types in the present study rely only on the material from areas U and W, since only they may be used for reliable statistical analysis. For this reason the listed vessels in the distribution (from both projects) and the calculated percentages (from areas U and W of the KRP) present slightly different pictures.

The proportions of vessel types and groups in the assemblage can be used for understanding the nature of the context – together with other evidence. In the case of the Early Iron Age layers at Tel Kinrot, the material seems to be of a domestic nature, in most if not all contexts. The excavation areas are not drastically different from each other in the proportions of the vessel groups, though some differences do exist (see Fig. 5.1). This general similarity reflects the domestic nature of the excavated areas, which are situated on the slope and close to each other, and mainly served as habitation quarters. There are no great differences in architecture between the areas. It needs to be remembered that the percentages of vessels in an archaeological context do not equal their shares in a *systemic* context (vessels in use at the same time in antiquity). The different breakage rates lead to over-representation of vessels that are prone to breakage, such as daily used bowls and cooking-wares (e.g. Arnold 1985: 152–153; Wood 1990: 88–93). At the same time, some vessels may stay in use for a long time.

The percentages of different types and subtypes are often of chronological interest. Many types are chronologically sensitive, but this is not the case for all types. This may be related to the rate of production, which again is dependent on the amount needed of each vessel type and its lifespan (e.g. Kramer 1985: 89–92; Wood 1990: 91–92). Given the differences in breakage rate between different vessel types, vessels of different ages exist in the same archaeological context. Large, unmovable containers may reach an age of a hundred years of use (London 1989: 44), while the life-expectancy of a bowl or a small to medium-sized cooking pot is only a few years (Shott 1989: 14). Thus, a household may need several new bowls and cooking vessels annually, as was the case in early 20th century CE Palestine (Einsler 1914: 257). Together with different recycling and disposal strategies, this limits possibilities of fine-scale chronological seriation (e.g. Kramer 1985: 91).

Vessel class \ Area	Area U Frequency	*Area U Percent*	Area W Frequency	*Area W Percent*	total Frequency	***total UW Percent***	Other Areas Frequency (%)
Bowls	419	*26,2*	122	*21.3*	541	***24,9***	110 (18%)
Chalices	23	*1,4*	1	*0,2*	24	***1,1***	13 (2%)
Lamps	7	*0.4*	0	*0*	7	***0,3***	29 (5%)
Storage jars	273	*17.0*	94	*16.4*	367	***16,9***	109 (18%)
Cooking pots	388	*24.2*	152	*26.5*	540	***24,8***	104 (17%)
Kraters	200	*12.5*	95	*16.6*	296	***13,6***	63 (10%)
Jugs	207	*12.9*	62	*10.8*	269	***12,4***	55 (9%)
Pithoi	27	*1.7*	20	*3.5*	47	***2,2***	21 (3%)
Small closed vessels*	30	*1.9*	11	*1.9*	41	***1,9***	81 (13%)
Other/undefined	18	*1.1*	14	*2.4*	32	***1.5***	22 (4%)
Basins	10	*0.7*	2	*0.3*	12	***0.6***	3 (0.5%)
Total	1602	*100.0*	573	*100.0*	2176	***100.0***	610

Fig. 5.1. Frequencies (rim counts) of the vessel groups. Counted rims from areas U and W and the material from all other areas, for which the figure is statistically unreliable. *Includes goblets, pyxides, flasks, and juglets.

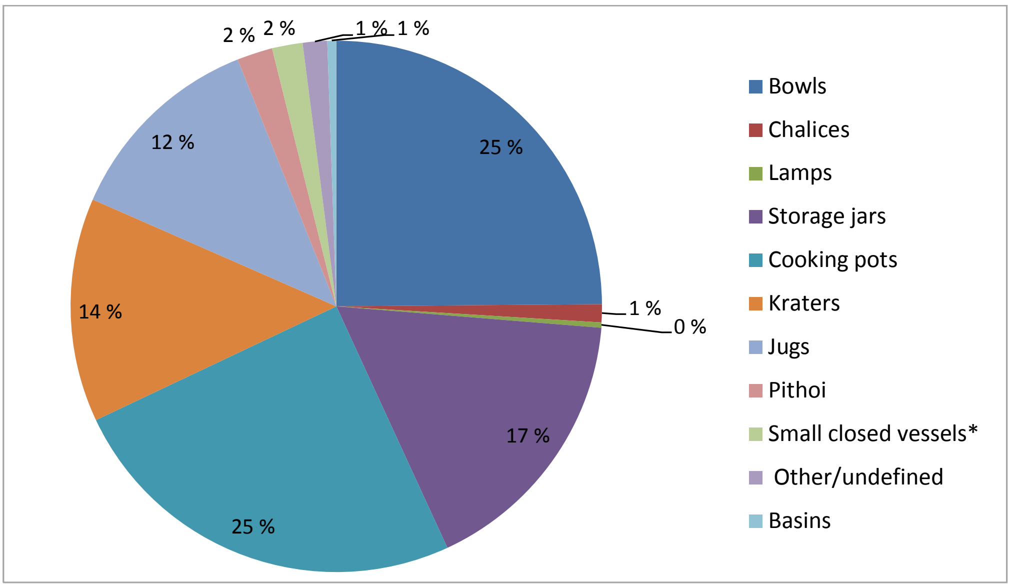


Fig. 5.2. Vessel class frequencies (rims from areas of intensive retrieval U/W) for all Iron Age phases combined.

Production of Tel Kinrot Pottery

The process of pottery production, distribution, use, and discard – like all cultural transmission – includes many and complex aspects of social reality, such as learning, appreciation, and group boundaries, and are multidirectional (e.g. Stark et al. 2008: 5–7; Collard & Shennan 2008 with references). There are several factors that affect the success of all innovations, and the change in material culture takes place at different paces on each occasion. There are instances where pottery has shown little systematic change during a sequence of 200 years (Sinopoli 1999: 135), while rapid changes may occur as well (Stark 1991).

The pottery from Iron Age Tel Kinrot generally seems to be thrown on a (fast) wheel. This can be assumed as the vessels are generally symmetrical, have walls of equal thickness on the horizontal level, and have thin, parallel lines on the walls, which are especially clear on the interior surface. The only vessels formed wholly without the help of a wheel (or turntable) were large basins. The forming techniques have not been intensively studied. One lower part of a potter's wheel has been found on a floor from the Iron I destruction layer, along with a large amount of pottery (area T), and another in secondary use integrated into a wall (area N). No fixed structures for pottery production, such as kilns, have been excavated at the site. Kilns have been published from many sites from Iron Age Israel-Palestine (Wood 1990: 26–32). Modern ethnographic research has also documented the open bonfire baking of ceramics in towns (Kramer 1997: 74–75, figures 12, 16), and such baking traditions may be hard to identify in archaeological remains.

The uniformity of the material with regard to technique and form indicates specialization at some level. The nature of pottery production at Tel Kinrot may reflect mass-production in workshop(s) on a commercial basis. This mode of production has been suggested in general for Israel-Palestine in Iron Age (Wood 1990: 33–50; see also Peacock 1982). The area surrounding the Sea of Galilee has alluvial deposits and clay sources available for ancient pottery production, and clay beds also exist at the foot of the Tel (chapter 3). It has been attested in ethnographic sources that potters prefer to use clay sources located within a few kilometers of their workshops (e.g. Arnold 1985: 32–60). Wood has suggested that ceramic production was widely practiced in ancient Israel-Palestine, as raw materials were widely available and pottery workshops could be located at places where there was a sufficient clientele (Wood 1990: 37, 50).

The scarcity of surface treatment is typical for most of the Tel Kinrot pottery types. The vessels rarely have slip, but red slip starts to appear sporadically in the later phase of the Main Iron I Horizon. Traces of white slip are rare, and probably at least some pottery fragments with white slip may be regarded as residual finds from earlier periods. Decoration occurs mainly on the outer surface of small closed vessels. When present, it usually consists of red and/or black horizontal bands on pyxides or jugs, and concentric circles on flasks. More complicated decoration appears on rounded jugs (type JG04) and few other individual items.

Material Included in the Typology, and Its Presentation

The present typology includes the pottery of the Iron Age phases at Tel Kinrot. It embraces both the material from Fritz's excavations (1994–2001) and from the Kinneret Regional Project (KRP, 2003–2008). The data concerning rim forms, thicknesses, and other details is based on the KRP material from areas, where intensive pottery retrieval was applied. The Iron Age layers contain shards from earlier periods, as a result of the continuous construction and other activities carried out on the slope. The Early and Middle Bronze Age material is in general easy to distinguish from the material of the Iron Age. These early types are included in the statistics as a combined group of "types of earlier periods", and their descriptions will appear in the Tel Kinrot II final report. For the types that typologically best fit the Late Bronze Age, I decided to give a short description. This material is not very distinctive as to its ware, and in some cases the possibility that they could originate in the Iron Age cannot be ruled out. However, their descriptions are short, and I list only a few parallels in order to give an idea of the material and its comparative framework. The Early Bronze Age material is distinctive both in its morphology and in its ware. Therefore, I have indicated these fragments only as EB-vessels in the tables that include all material from the phases under study. Material that typologically appears to derive from Iron Age II is included, even though it may in some cases originate from the upper mound. The life span and especially the end of occupation on the slope is to some extent open, and its continuation into the beginning of the Iron Age II cannot be excluded.

Each vessel type includes a description, followed by its distribution at Tel Kinrot according to their phases of origin, and parallels found in the literature. The distribution includes only the material from the excavations of 1994–2001 and 2003–2008 that is illustrated. The material from the excavations on the upper mound in 1982–1985 appears in the parallels, even though they derive from the same site, since I studied them only from the publication. In addition, it has not been possible to correlate between the strata from the upper mound and those from the slope. Fritz divided the Iron Age habitation into three strata: stratum VI – the Foundation of the Early Iron Age city; stratum V – the Main phase of the occupation with two sub-phases in area K; and stratum IV – a later squatter occupation phase (Fritz 1999; Fritz & Münger 2002). Since 2005, a new terminology has been adopted. The *Foundation Phase* can be correlated with stratum VI of preliminary reports. The *Main Iron I Horizon* includes several sub-phases and for most part correlates with stratum V (Fritz 1999: 94, 114; Knauf 2002, Münger 2005, 2009, Münger et al. 2009). This phase ends with a destruction layer identified in nearly all excavation areas, and most of the material derives from this layer. The correlation of the *Post-Destruction Phase* with stratum IV is plausible, though the transition is not clear-cut. Some remains assigned to the *later phase of the Main Iron I Horizon* could also be correlated with the former stratum IV. Strata VIII–VII have been dated to the Middle and Late Bronze Ages, but they have only been excavated to a very limited extent. There are pottery types that indicate a continuum from the Late Bronze Age to the Early Iron Age. However, no clear Late Bronze Age stratum has been identified at the site. Some of these items, like wide, shallow bowls may actually originate from the Iron Age phase. I have included material from strata VIII–VII in the presentation of certain types on typological grounds.

Chronological and Cultural Setting

Comparative material for the Tel Kinrot pottery comes mainly from sites that are located in the northern Jordan Rift Valley. Northern Israel and southern Syria have been seen as a cultural entity, with which Tel Kinrot could be related (Nissinen & Münger 2009). The northern Jordan Rift Valley indeed seems to be the best locale for most of the pottery types represented at Tel Kinrot. There is, however, the possibility that gaps in research conceal the real distributions, as there are no published sites from the Early Iron Age in southern Syria, and such are also rare in southern Lebanon. There are also some comparisons in the regions of modern southern Syria and Lebanon, especially for amphorae (Münger 2013); but these are too few to draw definite conclusions. There are differences in the distribution of pottery types: some vessel types seem to be dispersed over wide areas (cooking pots, rounded bowls BL02), while others show connections to the coastal region (jug type JG04 and bowl type BL04).

With the parallels my aim is to give the reader an overview of the chronological and regional affinities of each type, and an idea of their general popularity. I searched for parallels most intensively from the sites in the Jordan Rift Valley and the northern part of modern Israel. I studied several sites in different regions in order to see if there were differences in the distributions of different vessel types. Such differences indeed became apparent. I have included many comparisons for the Tel Kinrot material, for several reasons. Firstly, the cited parallels provide readers further references. Secondly, the parallels provide a measure of the popularity and chronological as well geographic distribution of the types, as well as differences in this regard: vessel of a certain type may be popular at some sites, and rare at others even during the same period. Thirdly, I decided to use all possible evidence in a consistent way for all vessel types. While for rare types it would require extensive use of publications to find even a handful of parallels, the same amount of literature will produce a host of references to other vessel types. This testifies to the popularity of the types. I have studied the comparative material only from publications, which has its limitations. The line drawings may sometimes hinder recognition of similarities. As I had to rely on drawings, I focused on morphology and surface treatment when searching for parallels. Not all sites of potential interest are included, e.g. ᶜAfula, Qarnei Hittin, Tel Harashim and Tell el-Wawiyat, due to a lack of published material at my disposal. The spelling of site names follows that used in the latest reports.

The Early Iron Age is a natural chronological framework for the material, but there are features that seem slightly earlier (e.g. fine ware bowls, crossing stripes on the handles of storage jars) or later (appearance of red slip, handles on a cooking pot with thick rim; hole-mouthed storage jars). There are several possible explanations for this. It may be that the habitation starts already in the very beginning of the Early Iron Age and extends to the beginning of Iron Age II, indicating a somewhat longer life span for the Iron Age habitation at Tel Kinrot than suggested by Münger (2013). Features harking back to the Bronze Age tradition may also reflect a conservative potting tradition combined with new ideas adopted from cultural contacts. Also, the selected retrieval strategy with all rims sorted and analyzed from areas U and W may have had an effect upon the chronologically mixed appearance of the assemblage. Possibly "residual" earlier items from the Late Bronze Age or "intrusive" later Iron Age II shards have not been cleaned out of the material. I preferred this strategy in order not to impose a pattern on the material that may not be inherently there. If, for example, shards typical of the Late Bronze Age appear in layers dated to the Early Iron Age, they may have been used together with the typical Iron Age vessels and are thus not necessarily "residual." The process of change in potting traditions is central to the assumption that pottery can be used as a chronological tool. Change and similarity are concepts that lack firm, commonly accepted definitions (David & Kramer 2001: 165). Similarities are commonly assumed to reflect cultural contact and diffusion, due to "conservatism and imitativeness as human characteristics" (Kenyon 1979: 15), even though the ethnographic evidence is controversial; some studies indicate that minor morphological variations can be used as chronological indicators (Maier 2007: 242), and that single innovations may spread very quickly (Stark 1999), while others question the chronological interpretation of small variations (Arnold 1985: 1–2; Franken 1969: 99–101). The suggested time sequence for the Early Iron Age at Tel Kinrot of probably 200 years is a relatively short time for the pottery morphology to show systematic change (Sinopoli 1999: 135).

In addition to chronology, pottery has often been used to identify *ethnic* groups (e.g. Albright 1932, Yadin 1972, T. Dothan 1982, Biran 1994). Ethnicity is a complex social construction, and cannot be identified on a material basis alone (e.g. Kletter 2006 with references). Social groups that define themselves as ethnic share a belief in common ancestry. Ethnic identity is constructed in social discourse, both textual and performative, and is perceived subjectively. While material symbols can become emblems of groups that understand themselves as ethnic ones, cultural patterning as such cannot serve as an indication of ethnic groups (Hall 1997: 2–3, 19–26). There may be 'ethnic' groups related to the Canaanites, Israelites, Arameans, Philistines, etc., but their identification would require a separate study. The biblical writings of *ʾam* Israel, its ancestral roots and exodus from Egypt to a promised land, may actually reflect a negotiation of ethnic identity during the time of their writing during and after exile, when the group was endangered – hundreds of years later than the Early Iron Age (Römer 2005: 126–127). Several of the group names are late, and their pre-history is speculative. The issue has been widely discussed for the Israelites and Philistines, but less so for the Arameans (Zadok 2012; 2013; Berlejung 2013), a group that might be of interest for Tel Kinrot (Münger 2013). I have avoided ethnically loaded terms in this study. Who the inhabitants of the Iron Age Tel Kinrot were, what name they called themselves by, and how they thought about their descent and relation to other people living in the region, cannot be judged by their pottery. Their material culture is locally rooted and shows relations extending in many directions, especially to the Jordan Rift Valley.

5.2 Type Descriptions

5.2.1 Serving vessels: bowls, chalices and goblets

Bowls

I consider bowls as relatively small open vessels, following the modern usage of the term. Bowls have a larger diameter than height. Another defining feature is that the rim represents the widest point of the vessels, or is approximately as wide as the possible shoulder (Yon 1981: 171–172). This broad morphological definition also covers chalices, lamps, and some cooking pots or kraters. Lamps have a nozzle and often traces of soot (5.2.6), but might in the shard material get mixed up with bowls if the nozzle is not preserved. Chalices have a high foot as a defining characteristic (below), which in the shard material makes a distinction from bowls problematic. Cooking pots are distinguished by their ware and generally larger size (see 5.3.5). The differentiation between bowls and kraters (5.2.2) is a complicated issue as well. As a result of varying definitions, these classes overlap at different sites (see Mazar & Panitz-Cohen 2001: 30). Vessels with larger over-all size and height in relation to width are generally defined as kraters, but there are no generally accepted criteria (Hunt 1987: 190, 193; Mazar & Panitz-Cohen 2001:30; Panitz-Cohen 2009: 214). Kraters can be considered as large and deep bowls (Hunt 1987: 193; Homès-Fredericq & Franken 1986: 23; Yon 1981: 63–64). Bowls or kraters are not always defined (e.g. Zarzecki-Peleg et al. 2005: 239–240, 263–264; Arie 2006: 193, 196; Panitz-Cohen 2009: 201–202, 211; Ben-Ami & Ben-Tor 2012: 411, 419). In such cases the difference between large bowls and kraters can be inferred by comparing descriptions and drawn vessels – in general the definition above holds.

Bowls are often considered as tableware for the serving and consumption of food and drink (Yon 1981: 171–172; Hunt 1987: 189–190; Yasur-Landau 2010: 199–200, 263–264). As there is a wide variety of forms, from small and deep to large and wide bowls, their use was likely varied as well. Bowls at Tel Kinrot are a heterogeneous group, difficult to classify and including several fluid types. The same has been noted on bowls at other Iron Age sites, such as Tell Deir ᶜAlla (Franken 1969: 145–146), Tell Keisan (Puech 1980: 222), and Tel Qasile (Mazar 1985: 33). Different definitions complicate the comparison of types between the sites. The same problem arises in many other vessel groups as well. Therefore, I have preferred referring to individual vessels as parallels, while the types are given as well if the definition is close to that at Tel Kinrot. There are certain types that are close to each other, and where the border between the types is to some extent arbitrary. This was the case especially between the two rounded bowl types: BL01 (shallow rounded bowls) and BL02 (small rounded bowls). The distinction between these two was extremely difficult in the case of small shards, where it is challenging to estimate the direction of the bowl wall. In the case of some small and worn shards, even the diameter is hard to estimate. In order to manage this difficult situation, I created a general group of rounded bowls (BL00) for those fragments where closer definition appeared to me too speculative. A somewhat similar situation came about with bowl fragments with an everted rim part, which might have been considered either carinated bowl rims, cyma-shaped bowls, or rounded bowls with s-shaped rims. For these small fragments, I created a group of everted bowls without closer definition (BL17).

At Tel Kinrot, bowls are the most frequent vessel class. There were 539 items registered as bowls from areas U and W during 2003–2008. This is 25 % of all pottery. The proportions of the other areas and earlier campaigns are in line with this figure. Altogether there are ca. 750 bowls. The majority of the finds are fragmentary, but many well-preserved vessels allow a spectrum of parallel material to be cited. As earlier material appears in the Iron Age layers due to the continuous building activities at the site, this material also appears in the tables that include all ceramic material from the areas of intensive retrieval (U and W). These types will be mentioned here only briefly, and described in detail in the report discussing the Bronze Age. Fig. 5.3 presents the distribution of bowl types in areas U & W over the stratigraphic phases.

Bowl type\ Local Strata U/W	Code	0	1	2	U3A/W3	U3B/W4	U4	U5	Total
Undefined rounded bowl	BL01/BL02	22	15	8	6	11	2	0	64
Shallow, rounded bowl	BL01	15	7	13	16	25	3	3	82
Small, rounded bowl	BL02A	34	12	18	28	39	1	0	132
Wide, thick-rimmed bowl	BL02B	5	2	2	1	6	0	0	16
Bowl with s-shaped rim	BL02C	3	2	0	2	3	0	0	10
Bell-shaped bowl	BL04A	1	0	1	2	1	0	0	5
Skyphos	BL04B	2	0	0	0	0	0	0	2
Carinated bowl	BL06	4	1	3	3	8	3	0	22
Biconical bowl	BL07A	13	2	8	3	4	0	0	30
Cyma-shaped bowl	BL09	11	4	8	17	10	0	0	50
Undefined, everted bowl	BL17 (BL06/09)	22	10	3	9	22	4	0	70
Types of MB & LBI	BL08, BL05	2	2	1	3	3	0	0	11
EB-platter	BL03	2	3	4	5	3	1	1	19
Undefined & varia	BL0	16	1	1	1	6	0	1	26
Total		152	61	70	96	141	14	5	539

Fig. 5.3. Bowl types of areas U & W according to the local strata

BL01 Shallow and Wide Rounded Bowls

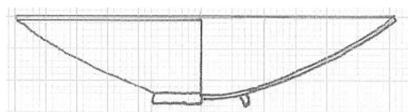
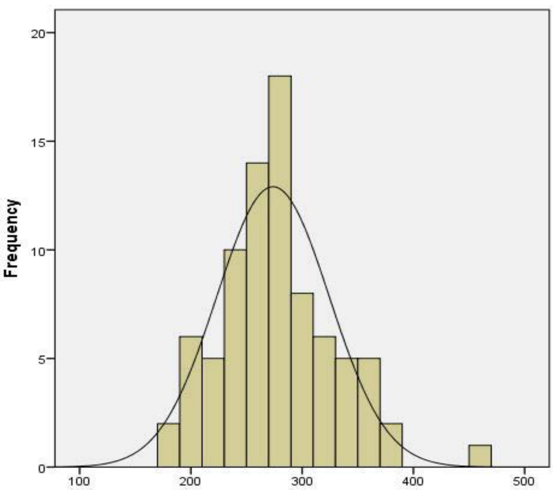


Fig. 5.4 BL01 Shallow and Wide Rounded Bowl, a prototype

These shallow, simple bowls (Fig. 5.4 and Appendix 5A) represent a Middle and Late Bronze Age continuation: a comparable type appears already in the layers dated to the Middle Bronze Age at many sites, e.g. at Yoqneᶜam stratum XXb (Ben-Ami 2005; Amiran 1969: 91–93, 124–125). However, I have excluded material from the MB and LBI layers from the comparisons in order to avoid creating too exhausting of a list. Such bowls are common at Tel Kinrot, with a frequency of 82 vessels/fragments (10 % of the bowls in areas U/W). While most of the well-preserved shallow bowls derive from stratum VII and the (constructional) fill below the Foundation Phase, there are also several rim fragments from later phases, and some of them are fairly large. It would be presumptuous to consider all of them residual only on typological grounds, especially as the ware is not distinctive. The shallow rounded bowls can be considered as a "parent" type for the small rounded bowl (BL02). These two rounded bowl types have a somewhat arbitrary and fuzzy border.

At first I defined the shallow and wide rounded bowl type by its height/width ratio, as in the well-preserved material from the 1990's excavations such a ratio could be estimated. The shallow rounded bowls had a height less than 1/3 of the width. However, for a major part of the material, the height cannot be securely estimated. Therefore, both the width and the angle of the rim turned out to be the more important aspects of type definition in practice. The opening of these bowls is over 20 cm wide, and often around 30 cm in diameter. Most vessels have a diameter between 24 and 36 cm (Fig. 5.5). The height varies mainly between 5 and 8 cm, but in most cases it can only be estimated. The rim is not prominently modelled, but most commonly rounded, simple, or cut. Slightly thickened rims are also rather common, while thinned rims occur on a few vessels. Only three vessels are preserved with a base, two have a ring base (6110/1, 6112/1) and one has a concave disc base. These bowls occasionally (9) have a slip, usually red or reddish-brown and in one case white. Few vessels have traces of burnish, and some fragments have a red band on the interior surface. Tempering materials include mainly basalt, but chalk and quartz particles are also rather common. The particles (grits) are of small to medium size (less than 0.5 mm in diameter).



Distribution:

Stratum VII: 5379/1, 5829/11, 6112/1, 6146/12, 6274/1, 9525/2 (L6188, R3).
Fill of the Foundation Phase: 4249/1, 4262/1, 6110/1, 6116/2.
Foundation Phase: 7755/1, 11050/1.
Main Iron I Horizon: 9042/1, 10239/19, 10612/2, 10847/2, 12074/3, 12142/5.
Post-destruction Phase: 11134/1, 11200/7, 12065/3, 12139/5, 14350/2.
Surface & colluvium below the surface: 11027/6, 10349/1.

Fig. 5.5 Distribution of the diameter of the Shallow and wide rounded bowls (BL01) with a Normal curve. Mean is 27.4 cm, standard deviation is 50.7, n=82.

Parallels:[10]
Tel Kinrot, Stratum V: Fritz 1990: 36, Pl.55: 3. Stratum II-I: ibid: 90, Pl. 55:2. Both fragments were considered stray finds, but the one from stratum V could also be contemporary to the context.

Jordan Rift Valley: **Dan,** Stratum VIII: Ben-Dov 2011: 203, Open bowls with a Simple rounded rim (BO1): Fig. 28:1; 29:16; 35:13; 113:1–2, 13; 115:1; 117:1; 134: 12; 149: 1; 150: 1; 161: 6, 8, 11. Stratum VII: ibid: Fig. 42:1; 66:11–12; 135: 1. Stratum VI: Ilan 1999: Pls. 44:2; 50:6–7. Stratum V:

[10] The referencing technique in the parallel lists deviates slightly from the one I use otherwise. This is because the editors of the excavation report wished a certain form, and I considered it not worth the effort to change each reference for the version that is now included in the PhD.

ibid: Pls.22:1; 29:9; 31:1. Stratum IVB: Pl.10:4. **Hazor**, Stratum 2: Yadin 1969: Pl. CCXCVII: 1. Area A, Stratum 8: Bonfil 1997: Figs.II:20:1–4, 6–12; II.24: 1–3; II.25: 1, 20; II.26:1–3 (see also reprinted bowls in Fig.I.27). Stratum XIV-XIII: Yadin 1969: Pl. CLX: 5–6. Stratum 1B: Yadin 1958: Pls. LXXXV: 1–5; XC: 1; Yadin 1960: Pl. CXVII: 1–2. Stratum 1A: Yadin 1958: Pls. LXXXVII: 10–13; XCI: 1–3. Stratum 1: Yadin 1958: Pl. CXXV: 1–3; CXLIII: 1–2. Stratum XIII: Yadin 1969: Pls. CLIX: 1–4, 12; CLXI: 12; CLXII: 4–5. Area A, Stratum 7A: Bonfil 1997: Fig.II.31:2; area A, Stratum 7B: Bonfil 1997: Fig.II.32:13 Stratum XII/XI: Ben-Ami/Ben-Tor 2012: 21, Figs.1.1: 3–6; 1.2:1, 3; 1.4:2; 1.7:1–3, 5; 1.10: 3–5. Stratum XB: ibid: Figs.2.1:2, 5; 2.2:1; 2.3:1, 13–14; 2.4: 5. Stratum XA: ibid: Figs.2.6: 2–3, 7–8; 2.7:1–2, 4; 2.8:1–3; 2.9:1; 2.10:4; 2.11:1. **Tel Yin'am,** Stratum XIII: Liebowitz 2003: 109, Figs. 1:2, 2:1. Stratum XIIB: ibid: 111–112, Figs. 8:4–5; 10:1. Stratum XII: ibid: Figs. 25:2; 26:2. Stratum XIIA: Figs. 30: 1–4; 31:1; 32:2; 40:2. Post-Stratum XII: ibid: Fig. 47:2. **ᶜEn-Gev,** R-11: Sugimoto 1999: Fig.1-1:7–9. **Tall Zarᶜa**, Phase IV.5: Dijkstra/Dijkstra/Vriezen 2009: Fig. 4.4:2; 4.8:6. Phase IV.4: ibid: Fig. 4.5:5, 6, 9, 10. **Beth Shean,** parallels that have been assigned into a typology of the level pre-IX and IX are of types BL5 and BL6 (Mullins 2007: 406–408) and those from level VI are of type BL72 (Panitz-Cohen 2009: 203–204). Pre-Level IX (R-2): Mullins 2007: Pls.38:3–4; 39:7; 42:2; 43: 10–11; 45:5–12; 49:4; 54:2. Level IXB (R-1b): ibid: Pls. 55:1–9, 16–21; 56:6–11; 57:1, 3–4; 66:5; 67:2; Level IXA (R-1a): ibid: Pls. 74:2–3; 76: 2–3; Level VIII: James/McGovern 1993: Fig. 16: 1–2; Level VII: ibid: Figs.12:9–11, 13–14; 13:1–2; 41:2–3; 43:1. Level VIB: (Stratum 4) Yadin/Geva 1986:55, Fig. 22:6–7; (Stratum N-3b) Panitz-Cohen 2009: Pl.12:11–12; 15:7, 11–12; (Stratum N3-a) ibid: Pl.14:3; 17:8–9. (Stratum S-4) ibid: Pl.25:7–8. Late Level VI: James 1966: Fig. 57:4; Lower Level V: James 1966: Fig.3:6; 7:2. Upper (?) Level V: ibid: Fig.25:23; Upper Level V: ibid: 3–4, 14. Level IV: ibid: Figs. 34:14; 39:3. **Pella**, Phase VA: Smith/Potts 1992: Pl.43:1, 4, 9, 21. **Tell Abu al-Kharaz**, Phase X: Fischer 2013: Fig. 99:1, 2. Phase XIV: ibid: Fig. 192:1. **Tell Deir ᶜAlla,** the Late Bronze Age Sanctuary, Phase A: Franken 1992: Figs.7-1: 6–7; 7-4: 5–8.Phase B: ibid: Figs. 7-5:4–6; 7-7:1–3. Phase D: ibid: Figs. 7-9: 6, 11; 7-10:19 – 22, 24–25. Phase E: ibid: Figs.7-16: 72, 75; 7-17:97, 102–104. Phase E7: ibid: Fig. 5-5:7. Phase E-8: ibid: Fig. 5-5: 7–8. Phase E9: ibid: Fig. 5-9:2–4. Phase E-10: ibid: Fig. 5-13:9. Phase F: ibid: Fig.7-21:18–19. **Tell Deir ᶜAlla,** the Iron Age habitation, Phase A: Franken 1969: Fig.46:46, 51. Phase B: ibid: Figs. 49:62; 50:30, 33, 37, 45. Phase C: ibid: Fig. 54: 58–59. Phase D: ibid: Fig. 57:2–4. Phase E: ibid: 66–68, 86. Phase F: ibid: Fig.61:71–72. Phase G: ibid: Fig. 64: 88, 100–103. Phase H: Figs. 66:76; 67:5, 13, 29. Phase J: ibid: Fig.69:65, 80. Phase K: ibid: Fig.71: 82–83, 91, 93 and 104. Phase L: ibid: Fig.75:13. (Parallels are mainly of Bowl types 5, 9, 10 and 13). **Tell es-Saᶜidiyeh**, Tombs of the earliest period: Pritchard 1980: 29, Figs. 7:1; 9:2–5; 10:1; 21:9. Tombs of the later period: ibid: Figs.8:1; 37:3. (Parallels are mainly of bowl type 5.) **Tall al- ᶜUmayri**, Phase 12: Herr 2002: 137, Fig. 4.9: 18. Phases 11B-A: ibid: 143–144, Figs. 4.12:1, 4.16:3.

Jezreel Valley: **Megiddo,** Stratum VIII: Finkelstein/Zimhoni 2000: Figs.10:4; 10.5:2. Stratum VIIB: ibid: Fig. 10.12:1, 4. Stratum VIIA: ibid: 10.8:6. Level F-9=Stratum VIII–VIIA: Ilan/Hallote/Cline 2000: Fig.9.10:23. **Yoqneᶜam**, Stratum XXa: Ben-Ami 2005: Figs.III.6:6–11; III.12:3–7. Stratum XIXb: ibid: Figs.III.14: 3–6; III.16:2, 6; III.17: 3–6. Stratum XIXa: ibid. Figs.III.18: 10–12, 19–20; III.26:2, 5–6, 10. Stratum XVIII: Zarzecki-Peleg 2005: Figs.I.1:3; I.3:3. Stratum XVII: ibid: Fig.I.29:3. Stratum XVI: ibid: Fig.I.36:4. Stratum XV: ibid: Fig: I.55:5. Parallels from Strata XX–XIX are mainly of Simple bowl types B CI and B CII (Ben-Ami/Livneh 2005: 253–256). Parallels from Strata XVIII–XV are mainly of Plate types B IVA and B IVBI some are of bowl type IB (Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor: 237–239, 245–246). **Jezreel,** fills below the Omride enclosure: Zimhoni 1997: Fig.1:5–6, 9. **Ta'anach,** Period IA: Rast 1978: Figs.3:6–7; 8:2, 5, 8. Period IB, ibid: Figs.13:9–10; 18:4. Period IIA: ibid: Figs. 25:9–10; 28:5.

Central Hill Country: **Shiloh,** Stratum VI: Bunimowitz/Finkelstein 1993: Figs. 6.30:1–26; 6.31: 1–16, 25–26; 6.32: 13, 15–16, 18, 21. Stratum V: ibid: Fig. 6.52:3–4.

Phoenician Coast: **Tell Keisan,** Level 11: Puech 1980: Pl.81:18. Level 9c: ibid: Pl.79: 14k. Level 9c, Pit 6067: ibid: Pls. 79: 13b–13c, 80:4a, 4e. Level 9a-b: Briend 1980: Pl.66: 5b, 8c. **Tell Abu-Hawam**, Stratum V: Hamilton 1935: Figs. 220, 224, 264–265, 289. **Tel Dor**, Ir1a horizon: Gilboa/Sharon: Fig.2:12. Irb horizon, area G Phase 7d–b: Gilboa/ Sharon/ Zorn 2004: Fig. 5:1; Phase 7a: ibid: Fig.7:1, 3. **Tyre,** Strata XVIII–X. Stratum XVIII: Bikai 1978: Pl. LIIA: 7–8. Stratum XVI: ibid: Pl. XLVIIA: 6–7. Stratum XV: ibid: Pl. XLII: 6, 9. Stratum XIII-1: ibid: Pl. XXXIII: 9, 11. Stratum XII: ibid: Pls. XXXII: 7; XXXI:3. Stratum XI: ibid: Pl. XXIX: 4–6. Stratum X-2: ibid: Pl. XXVI: 1–6. Stratum X-1 (fill): ibid: Pl. XXIII: 2, 6. **Sarepta,** Stratum J: Anderson 1988: Pl.23:7–8. Deposit JH: ibid: Pl.24:10. Stratum H: ibid: Pl.25:13, 16–17. Stratum G2: ibid: Pl.26:13–14. Stratum G1: ibid: Pl.27:11–13. Stratum F: ibid: Pl.29:18–20. Stratum D2: ibid: Pl: 32:13. Stratum D1: ibid: Pl.33:8–9, 13. **Khirbet Silm, Joya & Qrayé,** Iron Age cemeteries: Chapman 1972: 119–126, Figs. 24: 2340, 238,108, 110, 114, 117.

Philistine Coast: **Tell Qasile**, Stratum XI: Mazar 1985: Fig. 22:7. **ᶜIzbet Sartah**, Stratum III: Finkelstein 1986: Fig.11:1, 13 – 20. Stratum II: ibid: Fig. 16:1. Stratum II, Silos: ibid: Fig. 18:2. Stratum I: ibid: Fig. 20:3, 15. **Tell es-Safi,** Phase E4b: Gadot/Yasur-Landau/Uziel 2012: Pl. 12:1, 9. Phase E4a: ibid: Pl.12.6:6–7.Phase A4: Zukerman 2012: 267–268, Pls.13.10:13; 13.15:16.

Other: **Tell el Ghassil**, area I, Level I: Joukowksy 1972, Pl.I: 2. **Kamid el-Loz**, Layer 4: Slotta 1980: Pl.34: 7. Layer 3b: ibid: Pl.4:15. Layer 3a: ibid: Pls. 4:14; 30: 2, 4–6. Phases T3–T1, P5–P1/P2: Penner 2006: Tables 28–29. **Tell Afis**, Levels 10–8: Venturi 1998: Fig. 5: 1–15. Hama, Periods I–III: Riis 1948: 73, Fig.105.

BL02A: Small Rounded Bowls with Simple Rim

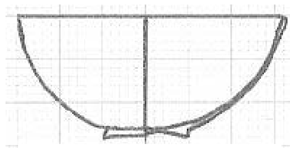


Fig. 5.6 BL02A, prototype

Fig. 5.7 BL02A

The small and simple rounded bowls (Figs. 5.6–7, App. 5A) represent a continuum with the Late Bronze Age tradition. Such bowls have simple rims and a height of 1/3 or more of the maximum width at the opening. Most commonly the ratio is around 2/5. The diameter of the opening is between 10 and 22 cm. Most bowls are 11 – 16 cm wide, with the mean at 14 cm (Fig. 5.8). The height varies between 5 and 10 cm – though in most cases the height can only be estimated. These bowls have simple rounded walls (4–7 mm thick). Sometimes the lip is slightly turned inside, and in a several cases the lip of the upright rim is thickened, but only slightly (the lip is usually 5–10 mm thick). Eight bowls were preserved with a simple, flat base (e.g. 10145/1, 14416/1) and two vessels with a shallow disc base (5379/1, 8498/1 – the latter is also slightly concave). There is usually no surface treatment, but red slip occurs on several fragments on the exterior surface, and in a few fragments on the interior. These bowls are usually strongly tempered, with small to medium sized basalt particles and with medium to coarse sized chalk particles. Other minerals occur to a lesser extent (in 10 % as the main and in 20 % as the second temper). This type is the most common type of all bowls, numbering 180 items (164 registered of the KRP and 18 of Fritz; 25 % in areas U/W). Such small rounded bowls are ubiquitous during the Early Iron Age throughout Israel-Palestine.

While the wider examples are close to the wide and shallow rounded bowls (BL01), rounded chalices (CL01) can also get mixed up with the small, rounded bowls in the shard material. However, in most cases the distinction is fairly secure, as the inverted and thickened lips are typical for chalices, while the simple rims characterize the bowls.

A few bowls have special features: a ledge rim (6477/3); a protruding ridge on the exterior below the lip (8699/1), and bar handle ending at a knob below the flat lip (6550/1, 7645/1). The small size and simple body shape of these items best fit this type, especially as the modelled rim parts are not very similar to each other and they occur in all Iron Age phases. The small rounded bowl with a ledge rim (6477/3) has parallels at Tel Dan stratum IVB (Ilan 1999: Pl.20:1) and at Tel Beth Shean level IV (James 1966: Fig. 68:10). The bowl with a ridge below the rim (8699/1) has close parallels at Tel Beth Shean P-8 (Bowl type 54, Mazar 2006: 329, Pl.18:4) and Tel Qiri, stratum V/VI (Ben-Tor & Portugali 1987: Fig. 23:3).

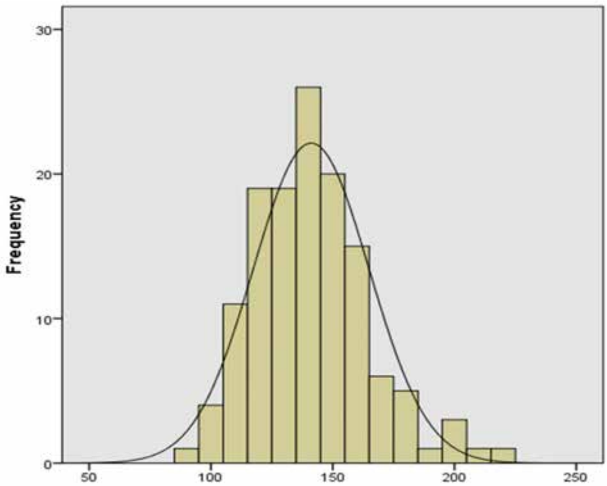


Fig. 5.8. Distribution of the diameter of the opening of the Small, rounded bowls (BL02A) with a normal curve. Mean at 14.1 cm, Standard deviation is 23.8, n=132. Figure is based on the material from intensive retrieved areas.

Distribution:

Stratum VII: 5379/1.

Fill of the Foundation Phase: 6116/2.

Foundation Phase: 4268/1, 6477/3, 10145/1, 12116/3, 12126/17.

Main Iron I Horizon (Str. VB, U3B, W3): 5161/3, 6650/1, 7404/1, 7506/1, 7645/1, 8498/1, 8699/1, 8716/1, 9062/1, 10269/3, 10270/2, 10279/5, 10280/4, 10999/2, 11543/3, 12149/9=12149/10, 12149/13, 12074/16, 12631/1, 14416/1.

Main Iron I-later phase (U3A, W2, former Str. VA): 10536/110999/2, 12049/5, 12089/7, 12148/12, 12148/16, 12183/2, 12176/5.

Post-destruction Phase (Stratum IV): 6550/1, 7623/3, 7666/2, 10247/1, 12378/1.

Surface and colluvium below the surface: 10215/1, 10216/5, 10229/1.

Parallels:

Tel Kinrot, Stratum V: Fritz 1990: Pl.55:1. Stratum IV: ibid: Pls. 84:1–2; 96: 1–2. Stratum II-I: ibid: Pl. 97:5–6. Stratum IB: ibid: Pl. 69:26.

Jordan Rift Valley: **Dan,** Stratum VII: Ben-Dov 2011: 204, BO4a open plain bowls: Fig. 150:3. Stratum VIII/VII: Biran 1994: Fig.72:1. Stratum VII: Ben-Dov 2011: Fig.71:1, 5; 119:2. Stratum VI: ibid: Pls.45:1; 52:1, 58:1. Stratum V: ibid: Pls.22: 3–4; 27:4; 35:9. Stratum IVB: ibid: Pls.6:1; 10:5; 18:2; 19:1. Hemispherical bowls (Ilan 1999: 70–71). **Hazor**, Stratum 2: Yadin 1958: XCV: 12. Stratum 1: ibid: XCVI: 1; (cistern 9017) Pl. CV: 1–11, 16–30; (cistern 9024): CXXV: 5–8, 19, 14; (Caves 7013 and 7015) Pl. CXLIII: 12–17; Yadin 1960: Pl. CXLI: 1, 7–8, 10; CLI: 10–16, 18–19. Stratum 1B: Yadin 1958: Pls. LXXXV: 6–7, 9; Yadin 1960: Pl. CXVII: 7–12, 15–16, 19, 29–35; (Tombs 8144, 8145 and 8065) Pls. CXXVIII: 1, 6–16; CXXXIX: 2–3; Yadin 1969: Pls. CCLXXI: 6, 16–22; CCXCI: 2–3. Stratum 1A: Yadin 1958: Pl. LXXXVII: 2–3; Yadin 1969: Pl. CCLXXIX: 3–15. Stratum XIV: Yadin 1969: Pl. CLVIII: 4–5; (Stratum 7B in area A) Bonfil 1997: Fig. II.31:1. Stratum XIVA: Yadin 1969: Pl. CLXII 19–21; (Stratum 7A in area A) Bonfil 1997: Fig. II.32:1, 8. Stratum XIII: Yadin 1969: Pl. CLXII: 10–11, 14, 16, 18, 21. Stratum XII/XI: Yadin 1969: Pls. CLXIV: 21–22; CCI: 2; CCIII: 5; (Pit 4010) Pl. CCXXXVIII: 1. Ben-Ami/Ben-Tor 2012: 21, Figs.1.2:2; 1.4:1; 1.7:4; 1.10:2. Stratum XB: Yadin 1969: Pl. CLXXI: 2–3, 5; Ben-Ami/Ben-Tor 2012: Figs.2.1:1, 3–4; 2.3:3–4; 2.4: 1–2. Stratum XA: Yadin

1969: Pl. CLXXIV: 1, 4, 6; Ben-Ami/Ben-Tor 2012: Figs.2.6: 1, 5; 2.7: 5, 8; 2.8:4, 6–9; 2.10: 1–2; 2.12: 4–5, 7. Stratum X-IX: Yadin 1969: Pls. CCX: 1, 3–4; CCXII: 4, 8; Phase 5 in area A: Bonfil 1997: Figs. II.35: 14; II.36:1. Stratum IX: Yadin 1969: Pl. CCVIII: 7, 11–16, 18–19, 22. **Tel Hadar**, Stratum IV (Kochavi, pers.comm.) **ᶜEin Gev,** Stratum V: Mazar/Biran/Dothan/ Dunayevsky 1964: Fig. 4: 8–10. Stratum IV: ibid: Fig.4: 19, 21. **Tall Zarᶜa**, Phase IV.2: Dijkstra/ Dijkstra/Vriezen 2009: Fig. 4.5:3. Phase IV.5, ibid: Fig. 4.5:4 **Tel Yin'am,** Stratum XIII: Liebowitz 2003: Fig. 1:3, 5; 3:1, 3. Stratum XIIB: ibid: Fig.6:2. Stratum XII: ibid: Figs. 13:1; 17:2–3; 22: 2–3; 26:1. Stratum XIIA: ibid: Figs.35: 1, 4; 42:5. Stratum post-XII: ibid: Fig. 47:1. Stratum XIA: Liebowitz 1979: Fig. 7:9. **Beth Shean,** Level IX (R-1b and 1a): Mullins 2007: Pls.55: 5, 8–9, 11, 16–20; 74:3; 76:2. Levels VIII-VII: James/McGovern 1993: Fig. 15: 7, 14 – 18, 21. Level VII: ibid: Figs. 8:1 – 3; 12: 5, 7–8; 27: 7–8; 33:1–2; 36: 1; 41:1; 43:1. Level VI: James 1966: 26, Fig. 55:1; 57: 1–3; 58:8; (Stratum 4) Yadin/Geva 1986: 52–55, Fig.22: 1–5; (S-5, S-4) Type BL75 Hemispherical bowls, Panitz-Cohen 2009: 204–205 Pl. 19:15–16, 18–19; 29:6; 32:7, 21. (N-3a, S-3) ibid: Pl.17:16; 38:1; 52:2; 65:1. Late level VI: James 1966: 14, Figs. 2:8; 52: 14–15; (N-2; S-2) Panitz-Cohen 2009: Pl.71:1–2; 73:1–2. Lower Level V: James 1966: 34, 140–143, Figs. 3:6; 4:1, 7; 5:13; 6:2–3; 18: 2–3; 20: 1–2; 21:3; 22:3; 23:5; 48:2; 59:1–3, 6; (Stratum 1) Yadin/Geva 1986: 11, Fig.6:1–3. Upper Level V: James 1966: 148, Fig. 31:3, 23; 63:1. Level IV: ibid: Figs. 26:9; 33:2; 36:4; 67: 14–16, 20–25; 68:7, 10. **Tel ᶜAmal**, Niveau IV: Levy/Edelstein 1972: Fig.15:12, 19. Niveau III: ibid: Fig. 15:1, 9. **Tel Rehov,** Stratum D-4: Mazar/Bruins/Panitz-Cohen/Plicht 2005: Fig.13.7:1, 4. Stratum VI: ibid: Fig. 13.18:1–3. Stratum V: ibid: Fig.13.23:1. Stratum V–IV (C1/E1): Mazar 1999: Fig 24:2. Stratum IV: Mazar/Bruins/Panitz-Cohen/Plicht 2005: Fig. 13.35:1. **Pella**, Phase VA: Smith/Potts 1992: Pl.43:8, 20. Phase IB: ibid: Pl.49:6. Phase IA: ibid: Pl.51:9–10. Phase Oa: ibid: Pl.67:6–7. **Tell Abu al-Kharaz**, Phase XI: Fischer 2013: Fig. 104:1. Phase XII: ibid: Fig. 21:1; 149:1. Phase XIII: ibid: Fig. 69:3; 159:2. **Tell Deir ᶜAlla,** The Late Bronze Age Sanctuary, Phase A: Franken 1992: 7-4: 11–12, 25.Phase B ibid: 1, 8. Phase C: ibid: Fig.7-8:1. Phase D: ibid: 2–3. Phase E: ibid: Fig. 7-16: 1, 3, 7, 9–12, 22–26. Phase E3: ibid: Figs. 4-8:14–15; 4-9:17. Phase E-4: ibid: Fig.4-14:2. Phase E-5: ibid: Fig.4-20:1–2. Phase F: ibid: Figs. 5-8:11; 7-21:5. **Tell Deir ᶜAlla,** The Iron Age habitation, Phase A: Franken 1969: Fig.46:23. Phase B: ibid: Fig.49: 56–57. Phase C: ibid: Fig. 54:22–23; 44–45. Phase E: ibid: Fig. 59:50, 96. Phase F: ibid: Figs: 61:78, 82; 62:6. Phase G: ibid: Fig.64: 46, 83. Phase L: ibid: Fig.75:1. **Tell es-Saᶜidiyeh**, Stratum VI: Pritchard 1985: Fig. 6:4. Tombs of the earliest period: Pritchard 1980: 29, Figs. 9:6; 24: 1–2; 34:3; 38:3 (Parallels are of bowl types 4 and 8). **Tall al-ᶜUmayri**, Phase B-11B: Herr 2000: Fig. 4.14:19; Herr 2002: Fig.4.12:9. Phase A-9/B-11A/F-9: Herr 2000: Figs. 3.13:1; 4.32:1; 6.8:13. Phase F-6: ibid: Fig.6.16:12, 19. Phase A-6B: ibid: Fig. 3.30:3–5. A-5: ibid: Fig.3.33:1–3.

Jezreel Valley: **Megiddo,** Stratum VIIB: Finkelstein/Zimhoni 2000: Fig.10.6: 3, 6; Martin 2013: 359–361, type BL60: Figs. 10.11:3–4;10.14:1; 10.17:1; 10.18:1–4; 10.23:1, 4. Stratum VIIA: Finkelstein/Zimhoni 2000: 242–243, Figs.10.1:1; 10.2: 1–3, 5, 11; 10.8:1–5; 10.10:2, 5; 10.13:1; Arie 2013: 483, type BL1: Figs. 12.62:1; 12.65:5; 12.67:1–2;. 12.72:1. Stratum VIB: Loud 1948: Pl.74:1–2, 5; Finkelstein/Zimhoni/Kafri 2000: Fig.11.6:3; Arie 2013: Fig. 12.73:1–2. Stratum VIA: Loud 1948: Pl. 71: 19, 23; 78: 2, 10–11; Finkelstein/Zimhoni/Kafri 2000: Fig.11.2:1; Arie 2006: Fig.13.51:1; 13.58:1; 13.59:1; 13.63: 1–2; 13.66: 1–2; Finkelstein 2006: Fig.15:2; Arie 2013: Fig. 12.77.1; 12.91:1. Stratum VB: Finkelstein/Zimhoni/Kafri 2000: Fig.11.24:1, 3. Stratum VA–IVB: Finkelstein/Zimhoni/Kafri 2000: Fig.11.30:1; Finkelstein 2006: Fig.15.6:1. **Yoqneᶜam**, Stratum XIXb: Ben-Ami 2005: 183, Figs. III.14:1–2, 5; III.16:8. Stratum XIXa: ibid: Fig. III.18:9, 20, 22. Stratum XVIIIb: Zarzecki-Peleg 2005: Fig.I.3:15–17; I.4:24; I.32:11. Stratum XVIIIa: ibid: Figs. I.3:2; I.4:1. Stratum XVIII: ibid: Figs.I.6: 1–2, 6; I.7:1. Stratum XVII: ibid: Figs. I.8:1; I.13:1, 9; I.14:2; I.19:1–2; I.25:1, 4; I.29:1–2, 4. Stratum XVI: ibid: Fig.I.38:1, 5. Stratum XV: ibid: Fig.I.53:1; I.55:2; I.57:1; I.64:6. Stratum XIV: ibid: Fig.I.40:2–3; I.42:1; I.45:1; I.58:11; I.61:2; I.62:18. Parallels are of bowl types B IA and B IB (one IC2a). **Jezreel,** fills below the Omride enclosure: Zimhoni 1997:

Figs. 3:1, 7–9, 16; 5:1; 8:3. **Ta'anach,** Period IA: Rast 1978: Figs. 1:15–17; 3: 9–12; 5:1; 8: 3–4. Period IB, ibid: Figs. 13:4–9; 17:1, 3. Period IIA: ibid: Figs.18:5; 23:4; 24:7; 25:11–12.

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Figs. 6.56:1; 6.57:1; 6.60:2.

Phoenician Coast: **Tell Keisan,** Level 9c: Puech 1980: Pls.79:14; 80:4, 4a, 4d. Level 9a-b: Briend 1980: Pl. 66:3–4, 6b-d; 7. **Tell Abu-Hawam**, Stratum V: Hamilton 1935: Figs. 233–234. **Tel Dor**, Ir1a(*l*) horizon: Gilboa/Sharon 2003: Fig.2: 1, 12. Irb horizon: ibid: Fig.7:3, 8; area G Phase 7a: Gilboa/Sharon/Zorn 2004: Fig. 7:6–15. **Tyre,** Stratum XVII: Bikai 1978: Pl. XLIX:20. Stratum XVI: ibid: Pl. XLVIIA:4. Stratum XV: ibid: Pl. XLII:5–6, 14. Stratum XIV: Pl. XXXIX: 13. Stratum XIII-1: ibid: Pl. XXXIII:5. Stratum XII: Pl. XXXI: 2. Stratum XI: Pl. XXIX: 7. Stratum X-1: ibid: Pl. XXIII:3. **Sarepta,** Stratum J: Anderson 1988: Pl.23:9. **Joya**, Iron Age cemetery: Chapman 1972: Fig.24:239.

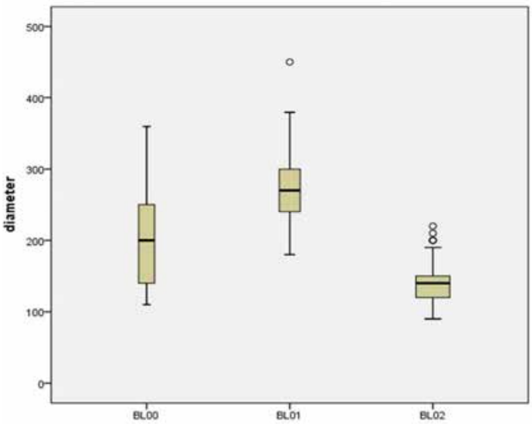
Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: Figs.11:2–4, 12; 12:1, 4, 6; 16:1, 11; 17:9–10. Stratum XI: ibid: Figs. 18:1–4, 6–7; 24:1–2; 26:3; 28: 5–11. Stratum X–IX: ibid: Fig. 32:1. Stratum X: ibid: Fig.33: 1–8, 12–14; 39:2, 7–8, 15; 43: 11–12. Stratum IX: ibid: Fig. 52:17. Stratum VIII: ibid: Fig. 55:4. Parallels are of bowl type BL1 except one that is of type BL4 (Mazar 1985: 33–35). **ᶜIzbet Sartah**, Stratum III: Finkelstein 1986: Figs. 10:15; 11:1–5. Stratum II: ibid: Figs. 16:1–2; 18:3. Stratum I: ibid: Fig.24:2. Parallels are of bowl type 5 (Finkelstein 1986: 54–56). **Tell es-Safi,** Temporary Stratum 6: Maier 2006: Fig.2:1–3. Phase E4b: Gadot/ Yasur-Landau/ Uziel 2012: Pls.12.1:1–2; 12.2:1–3; 12.4:2; 12.7:1–2; 12.8:1. Stratum E3 (pits): Zukerman 2012: Pl. 13.2:1–3. Stratum A5: ibid: Pl. 13.4:1, 8; 13.5:1–2; 13.6:1–3. Pre-A4: ibid: Pl.13.1–2. Phase A4: ibid: Pls. 13.7:1–3; 13.8:2–4, 16; 13.14:1–4, 8; 13.15: 7–8; 13.16: 1–2; 13.17:10–11; 13.18:15–19. Phase Pre-A3: ibid: Pls. 13.12:11; 13.13:1–2. Parallels are of type BL1 (Gadot/Yasur-Landau/Uziel 2012:243), 301.1-2 and 301.4 (Zukerman 2012: 271–273).

Other: **Tell el Ghassil**, area I, Level I: Joukowksy 1972, Pl. V: 2; area III, Level 12: ibid: Pl. XXXII:2. **Kamid el-Loz**, Phases T3–T1: Penner 2006: 189, Table 29. Types 1.2; 2.3c and 2.4 shown in Fig. 110. The Late Bronze Temple, layer 4, complexes F, H: Slotta 1980: Pls.1:1–3, 7–8; 4:6, 9–10. Layer 3: ibid: Pl.1:10. **Tell Afis**, Level 9c: Venturi 1998: Fig. 7:12, 14. Level 9b: Venturi 2000: Fig.6:7. **Hama**, period I: Riis 1948: 71, Fig. 98. Period II: ibid: 70, 73 Figs. 93, 106. Period IV: ibid: 70–71, Figs. 94, 99.

BL00 (BL01–BL02A) Fragments of Rounded bowls (not further classified)

This group consists of small simple rim shards that could only be assigned generally to rounded bowls. It was not possible to estimate the height of the vessel and thus the height/width ratio. The form seems to be simple and rounded. The rim is usually rounded and simple, but might be slightly thickened or thinned. They thus belong either to the shallow or small rounded bowls (BL01 or BL02A). None of the items assigned to this group was drawn. All 75 fragments derive from the KRP excavations (66 from areas U/W). The group is chronologically rather uninformative, as bowls that fit this general definition appear from the Middle Bronze Age until the Late Iron Age.

As can be seen from the Box plot in Fig. 5.9, the diameter of these simple rimmed bowls overlaps with the Wide and shallow (BL01) and Small rounded bowls (BL02A), and most rims assigned to this artificial group are around 20 cm wide. This is exactly the range where the decision between the rounded bowls BL01 and BL02A became difficult. The angle of the rim part would have been a relevant feature to look at for deciding between the two rounded bowls BL01 and BL02A. However, I had not recorded such feature. I could have modified the groups in the end by changing them from ratio-based into two or three groups based on diameter width, and setting arbitrary dividing points e.g. at 18 cm, or at 18 and 22 cm, based on two to three peaks in the diagram of diameters drawn from all rounded bowls together (groups BL01, BL02A, and BL00, Fig. 5.10). However, I considered creating such arbitrary groupings would have led to a loss of information. While the angle of the rim or wall was not explicitly measured and recorded, it was a feature that was included in the original ratio-based definition of the bowl types BL01 and BL02A. Therefore, I considered that factor while sorting the material. I thus decided to keep the original assignments if I was not able to check the items.



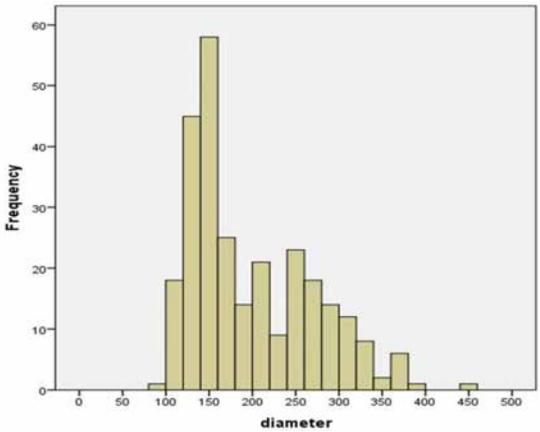


Fig. 5.9 (left) Box-plot of the diameter of the undefined rounded bowls, (BL00, n=62), Wide and shallow rounded bowls (BL01, n=82) and Small rounded bowls (BL02A, n=132); (N=276). Box width is proportional to group size.

Fig. 5.10 (right) Histogram of the diameter of all rounded bowls combined (BL00, BL01, and BL02A). Bar width is 20 mm. The histogram has a clear peak at 140–160 mm, while two peaks at 200–220 mm and 240–260 mm are less prominent.

BL02B: Wide Rounded Bowls with Thick Ledge rim

Fig. 5.11 bowl 10239/17

These rounded, shallow bowls have rather thick walls (5–11 mm, on average 9 mm) and a thickened lip forming a ledge (Fig. 5.11, App. 5A). The lip is about twice as thick as the wall below the rim (9–23 mm, in average 16.5 mm). These bowls are wide, 20–28 cm in diameter at the rim (in average 24.5 cm), and the body seems to be shallow (on estimation less than 8 cm), although not one vessel was preserved with its base. The thick lip is slightly turned inside and usually ledge-shaped. Eight vessels have red slip, and three have traces of burnish. The clay body often has traces of organic temper burned off, traceable as small elongated voids, while mineral particles have been used to a lesser extent. The most common temper minerals are basalt and chalk, typical for pottery at the site in general. This bowl type is not very common. Altogether 20 items have been assigned to this type (16 items in areas U/W, 3 % of bowls). Parallels mainly derive from Iron Age II contexts. Several large fragments derive from loci with no indication of mixing (loci 3018, 4301, and 4324), so the attribution of this type to the Main phase of the Early Iron Age at Tel Kinrot seems secure. I created this type late in process, by dividing the material assigned to rounded bowls using the distinctive rim form, thick walls, and wide diameter as the type indicator, as these features co-occurred meaningfully. Surface treatments also were relatively common compared with the rounded bowls.

Distribution:
Stratum VII: 11056/2 (from the uppermost basket, probably intrusive).
Foundation Phase: 6069/1.
Main Iron I Horizon-later phase: 10239/17, 12073/13, 12139/11.
Post-destruction Phase: 10267/3.
Surface and colluvium below the surface: 6016/27, 10256/2.

Parallels

Tel Kinrot, Stratum IV: Fritz 1990: Pls.84: 5–6; 95: 2–5. Stratum II: ibid: Pls.61:15–17, 20; 86: 9–12; 89: 19–21; 90: 1–3, 5–6. Stratum I: ibid: Pls.63:22; 64: 1–3; 67: 12–13; 70:10, 14–16, 22; 77:8.

Jordan Rift Valley: **Dan,** Stratum II: Biran1994: Fig. 167: 2–3. **Hazor,** Stratum XII/XI: Ben-Ami/Ben-Tor 2012: 21, Figs. 1.3:2. Stratum X: Yadin 1969: Pl. CCVII: 3–4; Stratum 5C in area A: Bonfil 1997: Fig. II.35:9. Stratum XB: Ben-Ami/Ben-Tor 2012: ibid: Fig.2.1:7. Stratum XA: ibid: 2.7:4, 11; 2.10:3. Stratum IX: Yadin 1960: Pl. LII: 5. Stratum 5A in area A: Bonfil 1997: Fig. II.39:1–2. Stratum IXb: Ben-Ami/Ben-Tor 2012: Fig.2.14:4; 2.16:1. Stratum IXa: Ben-Ami/Ben-Tor 2012: 2.18:3; 2.20:5. Stratum VIII: Yadin 1958: Pl. XLVII: 9; Yadin 1960: Pl. LIV:2, 7; Garfinkel 1997: Fig. III.26:1. Stratum VIIb: Ben-Ami 2012: Fig.3.12:8. Stratum VIIa: ibid: Fig.3.17:5. Stratum VII: Garfinkel 1997: Fig. III.34:16. **Beth Shean,** Burial with MB-material: Maier 2007: Pl.36:5. Level VII: James/McGovern 1993: Fig.12: 14. Late Level VII (N-4): Panitz-Cohen 2009: 203–204, Pl.1:10 of the type BL72. Level VI early; N-3b: Panitz-Cohen 2009: 203–204, Pl.15:18–19 (chalice type CH72). Upper Level V: James 1966: 32, 137, Fig.14:4; P-10: Mazar 2006: 328–329, Pl.15:4. P-8: ibid: Pl.18:8 (shallow vessels of Bowl type BL52) Level IV: James 1966: Figs. 67:19; 68: 11. **Pella**, Phase IB: Smith/Potts 1992: Pl.49: 3, 7. Plot IVE: Smith/Potts 1992: Pl.68:3. **Tell Abu al-Kharaz**, Phase X: Fischer 2013: Fig. 361:7. Phase XI: ibid: Fig.79:2; 122:1. Phase XII: ibid: Fig. 64:2. Phase XIV: ibid: Fig. 192:11; 386:2. **Tell Deir ᶜAlla,** The Late Bronze Age Sanctuary, Phase D: Franken 1992: Fig. 7-10:37–39. Phase E: ibid: Figs. 7-16:89; 7-17:101–102, 108–109. Phase F: ibid: Fig. 7-21:27. **Tell Deir ᶜAlla,** The Iron Age habitation, Phase B: Franken 1969: Fig. 50:75. Phase C: ibid: Fig. 54: 93–94. Phase D: ibid: Fig. 57:21. Phase E: ibid: Fig. 59:93, 95. Phase J: ibid: Fig.69:84, 91. Parallels are mainly of type 16. **Tell es-Saᶜidiyeh**, Stratum V: Pritchard 1985: Fig. 10:19–20. Stratum IV: ibid: Fig.15:6. **Tall al-ᶜUmayri**, PhaseA-8: Herr 2000: Fig.3.23:15

Jezreel Valley: **Megiddo,** Stratum VB: Finkelstein/Zimhoni/Kafri 2000: Fig.11.23:24. Stratum IVA: ibid: Fig.11.52:6; Finkelstein 2006: Fig.15:8. **Yoqneᶜam**, Stratum XVII: Zarzecki-Peleg 2005: Fig.I.25:7. Stratum XV: ibid: Fig.I.57:16; I.64:7. Stratum XIV: ibid: Fig.I.40:5; I.43:11. Stratum XIII: ibid: I.70:1; I.72:2. Stratum XII: ibid: Fig.I.77:6–7, 10; I.80:10–11, 13–14. Parallels are of type B II Ledged-rim bowls, especially sub-types B IIA1 and II B3 (Zarzecki-Peleg 2005:240–242).

Central Hill Country: **Shiloh,** Stratum IV: Bunimowitz/ Finkelstein 1993: Fig.6.66:3, 6.

Phoenician Coast: **Ḥorbat Rosh Zayit**, probable Stratum II, area B: (Gal/Alexandre 2000: 178, Fig.VI.11:6, 10. **Dor,** Stratum VII/Phase A-9: Gilboa 1995: Fig.1.4:6.

Philistine Coast: **Tell Qasile,** Stratum VIII: Mazar 1985: Fig. 55:18–21. **ᶜIzbet Sartah**, Stratum III: Finkelstein 1986: Fig. 11:15.

Other: **Hama,** Period IV: Riis 1948: 72, Fig 104.

BL02C: Rounded Bowls with Everted Rim

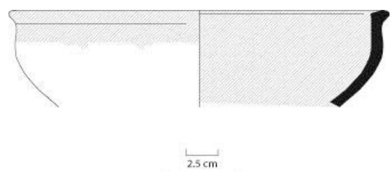


Figure 5.12: bowl 12078/2

These rounded bowls have a flaring upper part, giving the bowl slightly s-shaped profile. The diameter is at widest on the lip, between 20 and 26 cm. The round rim is everted and thinned or simple (Fig. 5.12, App. 5A). The walls are of medium thickness (6–9 mm). Some of these bowls have red slip. Only a few bowls of this type have been preserved with a large part of the body, and the rim fragments are not very common either. In addition to the six illustrated vessels, eight fragments have been assigned to this type. The rim shape is relatively close to the profile of both Bell-shaped (BL04) and Cyma-profiled bowls (BL09). However, there is no prominent gutter below the rim, which I considered diagnostic for the Cyma-profiled bowls, and these bowls are wider and shallower than the Bell-shaped bowls (BL04A).

Distribution:
Stratum VIIA (R6b): 11250/6 (Locus 6417).
Foundation Phase (fill of, H2): 6124/13.
Main Iron I Horizon: (S5): 12845/2 (Locus 1721)
Post-destruction Phase: 8618/3 (K1).
Surface: 5011/1, 6091/15; *Colluvium below the surface*: 12078/2.

Parallels
Tel Kinrot, Stratum II: Fritz 1990: Pls.61:16; 86:7; 89:22–23; 97:2. Stratum I: ibid: Pl.63:21; 69:21; 70:7.

Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pl. 50:5. Stratum V: ibid: Pls.22:2. Stratum IVB: ibid: Pl.16:5. **Hazor,** Stratum XIV-XIII: Garfinkel 1997: Fig. III.17:8. Stratum 1B: Yadin 1969: Pl. CCXCI: 4. Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Figs. 1.3:3; 1.5:1, 3; Yadin 1969: Pl. CLXIV: 13, 15, 20; CLXX:5; CCI: 1, 3. Stratum Xb: Ben-Ami 2012: Figs.2.1:7; 2.3:5; Yadin 1969: Pl. CLXXI: 11. Stratum IX: Yadin 1960: Pl. LII:2; Yadin 1969: Pl. CCXII: 20. Stratum VIIIb: Ben-Ami 2012: Fig.3.2:5. Stratum VIIIa: Ben-Ami 2012: Fig. 3.4:4; 3.7:5. Stratum VIII: Yadin 1960: Pl. LIV:6, 12. Stratum VII: Yadin 1960:15, 17. Stratum VIIa: Ben-Ami 2012: Fig. 3.21:6. Stratum VIII-VII: Yadin 1969: Pl. CCXIV: 27. **ᶜEin Gev,** Stratum V: Mazar/Biran/ Dothan/Dunayevsky 1964: Fig. 4:1. **Tel Yin'am,** Stratum XIII: Liebowitz 2003: Figs.1:3 (of type 1G and parallel our type 3); 3:1–2. Stratum XIIB: ibid: Fig.8:4. Stratum XII: ibid: Figs.11: 4; 26:1. Stratum XIIA: ibid: Figs. 30:2, 5; 32:3; 41:3. Post-XII: ibid: Fig.47:2. **Beth Shean,** Level pre-IX=R-2: Mullins 2007: types BL8b and BL10b: Pls. 38:6, 11; 44:1; 49:5. Level IXB=R1b: Mullins 2007: Pl. 57:6; 70:8. Level VIII: Fitzgerald 1930: 41:13; James/ McGovern 1993: Fig.15:9. Level VII: ibid: Fig.20:1. Mullins 2007: Pl.73:3; Level VII early= S-5: Panitz-Cohen 2009: 205–206; Pl.20:20. Late Level VII=S-4, S-3, N-3: ibid: Pl.39: 12–13, 17; 49:7; 52:11; 66:4. Parallels are mainly of bowl type BL77. Level VI (early) = Stratum 4: Yadin/Geva 1986: Fig. 22:8 – 9, 13–14. S-2: Panitz-Cohen 2009: Pls.71:3; 72:1; 73:6. Level V: James 1966: Fig.4:1. Lower Level V: James 1966: Fig. 6:6; 25:18; 26:10; 59:5, 8. Upper Level V: James 1966: Fig.44:5; 47:3; 63:2, 13. Parts of Level V (upper) S-1a: Mazar 2006: Pl.11:14. P-8: Mazar 2006: 330; Fig.18: 6–7, round bodied examples of bowl type BL56. Level IV: James 1966: Fig. 67:26–28.**Tel Rehov,** Stratum VII (D-4): Mazar/Bruins/Panitz-Cohen/Plicht 2005: Fig.13.7:6. D-3: ibid: Fig. 13.9:3. Stratum V: ibid: Fig.13.23:2; 13.24:1. Stratum V–IV (C1/E1): Mazar 1999: Fig 24:4. Stratum IV: Mazar/Bruins/Panitz-Cohen/Plicht 2005: Fig. 13.35:5. **Pella**, Phase II: Smith/Potts 1992: Pl.47:8. Phase IA: ibid: Pl.52:2, 5. Stratum 8: ibid: Pl.64:5. **Tell Abu al-Kharaz**, Phase XII: Fischer 2013: Figs. 21:5; 64:1; 82:3. **Tell Deir ᶜAlla,** The Late Bronze Age Sanctuary, Phase E3:

Franken 1992: Figs.4-8:6; 4-9:18. Phase F: ibid: Fig.7-21: 6, 8. **Tell Deir ᶜAlla,** The Iron Age habitation, Phase A: Franken 1969: Fig.46:24 (type 4b), 41 (type 5f). Phase B: ibid: Fig.49:66 (type 4b), 91 (type 4f). Phase C: ibid: Fig. 54:25 (type 4b), 27 (type 4c). Phase D: ibid: Fig. 56: 71–72 (type 4h). Phase E: ibid: Fig. 59: 54 (type 4b), 56 (type 4c). Phase G: ibid: Fig. 64:48 (type 4d), 51 (type 4f). Phase G: ibid: Fig.64:48 (type 4d). Phase J: ibid: Fig.69:61 (type 4a). Phase L: ibid: Fig.75:14 (type 5k). **Tell es-Saᶜidiyeh**, Stratum VII: Pritchard 1985: Fig.3:6. **Tall al-ᶜUmayri**, Phase A-10: Herr 2000: Fig. 3.10:6.

Jezreel Valley: **Megiddo,** Stratum VIIA=F-7: Ilan/Hallote/Cline 2000: Fig.9.14:3. Finkelstein/Zimhoni 2000: 242–243; Fig.10.2:6. Stratum VII: Loud 1948: 71:20. Stratum VIA: Arie 2006: Fig.13.58:10. **Yoqneᶜam**, Stratum XIXb: Ben-Ami 2005: Fig.III.14:15–16; III.16:13. Stratum XIXa: ibid: Figs.III.23:3–4; III.26:13. Stratum XVIIIa: Zarzecki-Peleg 2005: Fig.I.32:3. Stratum XVII: ibid: Fig.I.2:1. Stratum XIII: ibid: Fig.I.75:16 (close to our bowl 12078/2). **Tel Qashish,** Stratum VIII: Ben-Tor/Bonfil 2003: Fig.93:3; 94:3 of Bowl type VIb (close to our Bowl 11250/6). Stratum VI: ibid: Fig.108:4–5. Stratum V/IV: ibid: Fig.130:7.

Central Hill Country: **Shiloh,** Stratum VII: Bunimowitz/ Finkelstein 1993: Figs. 6.23:4

Phoenician Coast: **Tell Keisan,** Level 11: Puech 1980: Pl.81: 15b. Level 9c: ibid: Pl.79: 5b, 6c, 7e–7h, 8a, 11. Level 9a-b: Briend 1980: Pl.66:10a. **Tell Abu-Hawam**, Stratum V: Hamilton 1935: Fig.253. **Tel Dor**, Ir1a|b horizon: Gilboa/Sharon 2003: Fig.6:12. Ir1b horizon: ibid: Fig. 7:2, 12–13. **ᶜIzbet Sartah**, Stratum III: Finkelstein 1986: Fig.11:9; 12:3. **Tell es-Safi,** Phase E4b: Gadot/ Yasur-Landau/ Uziel 2012: 245, Pls.12.1:3–4, 6–7; 12.2:5–6; 12.4:3, 5; 12.7:5; 12.9. Stratum E3: Zukerman 2012: Pl.13.2:5.

BL03: Fine Ware Bowls


Fig. 5.13. BL03, a prototype

The small bowl fragments assigned to this group are characterized by their fine ware, thin walls, and light-colored clay bodies (Fig. 5.13). In addition, these fragments have a careful finish on their surface. The Fine ware bowls are 15–20 cm wide at their rim, and their lower part seems to be rounded, though not one has a preserved base. They have white slip and a burnished surface. Thus, these fragments share several characteristics that set them apart from most bowls from Tel Kinrot. At the same time, it has to be acknowledged that they can be considered to belong to several types.

Morphologically, the Fine Ware bowls are rounded bowls with thin walls (2–5 mm thick). Most commonly they have thinned lips, while there is variation in the rim shape. A few of these Fine Ware Bowls have a rather upright upper part and simple or slightly S-shaped rim part (5096/11, 5562/1). Five Fine Ware bowls (6605/1, 8042/1, 9241/1, 10015/1, and 12042/3) have inverted rims typical for the Cypriote white-slip-ware, or “Milk-bowls” (Fig. 5.14), and two also include the beginning of a wish-bone handle. These fragments may well be from vessels that have been imported from the Mediterranean. They are of fine clay with very few and small mineral inclusions, and the material seems different from most pottery vessels at the site. Several of these bowls have painted geometric decoration in brown or dark grey. Rim fragments 5819/2 and 9544/1 have a very close parallel at Tel Beth Shean level IX2 (Mullins 2007: Pl. 65:5), identified as Cypriot White Slip I/II. Rim fragment 7726/1 has a parallel at Tel Beth Shean Lower level VI identified as Mycenaean import (James 1966: Fig. 58:11).

These bowls represent the Late Bronze Age tradition, and at least some of the fragments most likely derive from earlier layers. Several items were identified as imports by Volkmar Fritz.

These identifications are added in the distribution list after each item. As petrographic or chemical analyses are lacking, their identification as imports remains unattested. Even if they were of local production, they reflect connections to areas of imported fine wares in the Mediterranean. In recent reports, it has been customary to assign imported wares and their local imitations to a separate chapter written by a specialist (see e.g. Megiddo V, 2013). The Fine Ware bowls will be discussed in detail in volume II, 1 (The Bronze Age Finds). However, all except one small shard of the Fine Ware bowl fragments were found in the Iron Age layers or uppermost mixed deposits. Eight fragments derive from the Main Iron I Horizon, while only two fragments were found in the Foundation Phase of the Early Iron Age city, and two from the constructional fills of the Foundation Phase. While such small shards may be residual, Fine Ware bowls – both imports and their imitations – also appear during the Early Iron Age, although they are rare (Gilboa 2015b: 483).

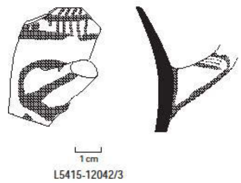


Fig. 5.14. bowl 12042/3

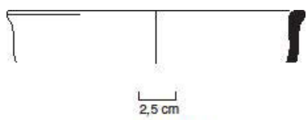
Distribution:
Locus 2912 (dated to the Late Bronze Age): 5819/2.
Foundation Phase, fill of: 4286/1 (Cypriote white-slip-ware=WS), 4286/2 (Mycenaean).
Foundation Phase: 5650/1 (pre-Q2; Chocolate-on-white), 7747/2.
Main Iron I Horizon: 6605/1 (Cypriote WS), 7726/1, 7680/2 (Mycenaean), 7841/10 (Cypriote WS), 8216/8 (Chocolate-on-white), 8464/12 (Chocolate-on-white), 9010/1, 9544/1 (Cypriote WS).
Surface: 5562/1, 6414/1 (Cypriote WS), 8042/1 (Cypriote WS), 8559/1, 8555/1 (Chocolate-on-white), 9241/1 (Cypriote WS); 10010/1 (Cypriote WS), 10015/1 (Cypriote WS), 12042/3.

Parallels
Tel Kinrot, Stratum IV: Fritz 1990: Pl.96:1.

Jordan Rift Valley: **Hazor,** Stratum 2: Yadin 1969: Pl. CCLXI: 32, 35. Stratum IXb: Ben-Ami 2012: Fig.2.16:7 (probably of a chalice). **Beth Shean,** Level pre-IX=R-2: Mullins 2007: mainly of type 12b: Pl.38:11, 13–16; 43:12–13; 44:1. Level IX2=R-1b: ibid: Pls. 67:5; 68:6.Level VIII: James/McGovern 1993: Fig. 16:4. Early Level VI: James 1966: Fig. 58:11. Parts of Level V (upper): Mazar 2006: bowl type BL59: 333; Pl.15:5–6; 16:6. **Pella**, Phase VA: Smith/Potts 1992: Pl.43:13–15. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 355:1–3. Phase X: ibid: Fig. 355: 4–6. **Tell Deir ᶜAlla,** The Iron Age habitation, Phase G: Franken 1969: Fig.64:84 (type 4f). **Tall al-ᶜUmayri**, Phase B-12: Herr 2002: Fig. 4.9:21–22, 24, 26–27.

Jezreel Valley: **Megiddo,** Stratum IX (Level F-10): Gadot/Yasur-landau/Ilan 2006: 174, Fig.12.4:12 (identified as Chocolate-on-White-ware). **Yoqneᶜam**, Stratum XXI: Livneh 2005: Fig. II.25:9–11, 13. **Tel Qashish,** Stratum VIII-VIIB: Ben-Tor/Bonfil 2003: Fig.99:11.

BL04A: Bell-shaped Bowls



Figs. 5.15 and 5.16 BL05, 11578/1 and 10410/6

These bowls show a connection to the Philistine coastal region. They have a rounded, relatively deep body and upright or slightly inverted upper part. The rim is somewhat modelled: it is usually slightly thickened and/or turned out at the lip (Figs. 5.15–16, App. 5A). The well-preserved bowls are 9–12 cm high and thus higher and deeper in general than the simple, rounded bowls (BL02). The ratio of height to width is ca. 3/5. Three bowls (4432/1, 6761/2, 6881/1) have a vestigial horizontal handle 2–2.5 cm below the rim. A comparable type has been discussed in detail by Trude Dothan (1982) and Amihai

Mazar (1985). At Tel Kinrot, the Bell-shaped bowls are 15–22 cm wide and 9–12 cm high. They are of the same size as the majority of the examples from Tell Qasile (Mazar 1985: 88).

Trude Dothan associated the vestigial handle with the debased phase of Philistine pottery (Dothan 1982: 105). Bowl 7785/4 has a handle that protrudes slightly from the vessel surface and can be considered semi-functional in her classification, and thus close to the most common type of the Philistine coast and typical for phase 2 of the Philistine pottery (Dothan 1982: 98). A similar development seems to take place at Tel Qasile, where functional handles are common in strata XII and XI, while the vestigial handle appears in stratum XI and increases in stratum X. Throughout the Qasile strata XII–X the bowls without handles are common as well (Mazar 1985: Figs. 11, 13, 16, 18, 19, 22, 24–26, 29, 32, 34, 43–45).

At Tel Kinrot, bell-shaped bowls are plain, except for two rim shards. The decoration pattern of small bowl fragment 5096/11 is typical for the Philistine pottery, while its fine ware and thin walls hark back to the Late Bronze Age tradition. This bowl has a small rim diameter of only 13.5 cm. The other decorated fragment (6091/16) from the surface is also of fine ware compared to most bell-shaped Bowls from Tel Kinrot. This rim fragment has red painted decoration. The pattern includes only two vertical and horizontal lines forming a ladder and is different from the usual spiral motif of Philistine bowls (Dothan 1982: 98). However, a similar pattern appears between two spirals on bowls from Tel Qasile strata XI and X (Mazar 1985:90, Figs. 22:28; 43:13). No slip has been recognized on the bowls from Tel Kinrot. This might indicate a relatively late date for the bowls from Tel Kinrot, as most of the vessels from Qasile stratum XII have white slip, which becomes less frequent in the later strata XI and X (Mazar 1985: 88–89; Dothan 1982: 98). Another explanation may lie in the regional preference for plain vessels. The wall thickness of the bowls from Tel Kinrot varies between 6–9 mm, except for the only decorated bowl, which is slightly thinner (4–5 mm). They can thus be regarded as a heavy type, typical of the inland sites of northern Palestine (Mazar 1985: 90). The plain surface and ware, tempered in a way typical for Tel Kinrot, indicate a local origin for the vessels. The clay body is strongly tempered with small basalt inclusions, and to a lesser extent with rather coarse chalk inclusions. In addition to the eleven illustrated bowls, there are five rim fragments from Early Iron Age contexts. Altogether fifteen Bell shaped bowls or bowl fragments have been registered (six in areas U/W). Bell-shaped bowls are quite similar to bell-shaped kraters (KR05, below), which are larger and usually have more pronounced rims (see also Furumark 1941: 49–50; Dothan 1982: 98, 106; Mazar 1985: 90–92). Rim fragments over 22 cm wide were considered kraters, and those 15–22 cm wide were considered bowls. This division is admittedly arbitrary. The Bell-shaped bowls were defined with the help of seven well preserved vessels from the 90’s excavations. However, the Bell-shaped bowls have relatively similar rim forms as the Rounded bowls with everted rim (BL02C), which differ from the Bell-shaped bowls in their flaring rim and wider diameter.

Mycenaean bowls of a similar shape were described and termed “Bell-shaped” by Furumark, as in his types 284 and 285, dated to Myc. IIIA:2–IIIC:1 late (Furumark 1941: 49–51, Figs. 13–14; Leonard 1994: 117–122). Bowls of a similar shape, regarded as Late Helladic IIIB, have been published by Desborough (1964: 2, Figs. 1c, d). The relation between Philistine and Aegean pottery has been discussed by Yasur-Landau (2010: 227–231, 243–266). The Bell-shaped bowls are the most common open vessel in the periods of LH/LM IIIC, but they were not commonly imported to the Levant, and their popularity in Philistia has been interpreted as a result of immigration in the Early Iron Age (Yasur-Landau 2010: 246–250, 263–264, 280).

Distribution:
Foundation Phase: - .
Main Iron I Horizon: 4432/1, 5096/11, 6761/1, 6761/2, 6881/1, 7785/4, 9560/1, 9596/1, 10410/6, 10684/3, 11578/1.
Post-destruction Phase: 10272/9 (L4217).
Surface: 6091/16.

Parallels
Jordan Rift Valley: **Beth Shean,** Late Level VII=N-3 Panitz-Cohen 2009: Pl.17:17. Tomb 221 in the Northern Cemetery: Dothan 1982: Fig.1:5. **Tell Abu al-Kharaz**, Phase XIV: Fischer 2013: Fig. 191:9 **Tell Deir ᶜAlla,** The Iron Age habitation, Phase A: Franken 1969: Fig.46:26 (type 4d), 29 (type 4f), 42 (type 5f). Phase B: ibid: Fig.49: 71–74, 76 (type 4d). Phase C: ibid: Fig. 54:36 (type 4g). **Tell es-Saᶜidiyeh**, Stratum V: Pritchard 1985: Fig.10:26. **Tall al-ᶜUmayri**, Phase B-11A: Herr 2002: Fig. 4.16:2.

Jezreel Valley: **Megiddo,** Stratum VIB (Level F-6): Finkelstein/Zimhoni/Kafri 2000: Fig.11.1:2; Arie 2006: 195, Fig. 13.51:3. Stratum VIA: ibid: Figs. 13.58:2; 13.63:6; 13.70:2. Stratum VI: Loud 1948: Pl.85:1. Parallels are of Type BL8 (Arie 2006: 195). **Yoqneᶜam**, Stratum XVII: Zarzecki-Peleg 2005: Fig.I:19:11 – parallels a transition between types BL5 and BL09A. Its' body shape is very similar to our bowl 9560/1 assigned to BL05 though it is somewhat a borderline-case. **Tel Qiri,** Stratum VIII-IX: Ben-Tor/Portugali 1987: Figs.19:1; 29:14. Stratum VIII: ibid: Fig.25:12. Parallel type at the site is the Bowl group B IVc Bell-shaped (Hunt 1987: 190–191). **Tel Qashish,** Stratum V/IV: Ben-Tor/Bonfil 2003: Fig.130:8.

Phoenician Coast: **Tell Keisan,** Level 10: Puech 1980: Pl.81:20. Level 9c: Puech 1980: Pl. 79:5, 5a, 5d, 6b. Level 9a-b: Briend 1980: Pl.66: 2, 2b, 2j–k, n. Level 8: ibid: Pl.55:10. **Tel Dor**, Ir1a|b horizon: Gilboa/Sharon 2003: Fig.2:13. **Tyre,** Stratum XV: Bikai 1978: Pl. XLII: 14. Stratum XIII-2: ibid: Pl. XXXVII:10. **Sarepta,** Stratum G2: Anderson 1988: Pl.26: 20, 22, 26. Stratum F: ibid: Pl.29:24. Parallels are mainly of type 22B.

Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: Figs. 11: 11, 13–14; 13:1–14; 16:18–19, 23–24; 17:11. Stratum XI: ibid: Fig.18: 25–27; 19: 1–3; 22: 27–28; 24:11–14; 25:7–9; 26:7; 29: 10–17; Maisler 1950–51: Fig.4:7–9. Stratum X–IX: Mazar 1985: Fig.32:2. Stratum X: ibid: Fig. 34: 1–8; 43:13; 44: 4, 6, 21–22; 45:17. Parallels are of Philistine bowl type BL 1 (Mazar 1985: 87–90). **ᶜIzbet Sartah**, Stratum III: Finkelstein 1986: Fig.11:7. Stratum II: ibid: Fig.17:2. Stratum I: ibid: Figs.19:22; 20:1. **Tell es-Safi,** Stratum E3: Zukerman 2012: Pl.13.1:1. Stratum E3: ibid: Pl.13.2: 9–11. Stratum A5: ibid:Pl.13: 3, 11; 13.5: 8–9. Stratum A5-A4 (=Temporary Stratum 6): Maier 2006: Fig.2:4. Pre-A4: Zukerman 2012: Pl. 13.11: 19–21. Stratum A4: ibid: Pl.13.8:8; 13.14:12; 13.17:20; 13.19:12. Phase A3: ibid: Pl.13.10:14–17.

BL04B: Small Deep Bowl with Handles on Rim


Fig. 5.17. Small Deep bowl 12030/1

There are two vessels that recall the Bell-shaped bowls in their general form, but are smaller and have a distinct decoration pattern (Fig. 5.17). One restorable bowl (12030/1) was found in the topsoil, and one rim fragment (12068/2) from erosional fill close to the surface, both in area W. They are 13 cm wide at the rim, and the height of the wholly preserved vessel is approximately 13 cm as well. There are two small horizontal and non-functional ledge-handles below the rim. The bowl is decorated on the exterior in red and black/brown paint, with a geometric pattern of horizontal and diagonal bands and a wavy band at rim. The bowl has a rounded body and a small ring base with a hole in the middle, seemingly drilled before firing. The function of the vessel remains unclear. Bowl 12030/1 has been published by Zangenberg et al. (2005: 190) and Münger (2013). In the latter, it was termed a skyphos. While a skyphos in the Greek tradition indicates a drinking cup (Clark et al. 2002: 2, 145), the label is somewhat problematic: with a hole at the base the vessel cannot be a drinking vessel. The handles, base form, and surface treatment are also different from the later Persian or Hellenistic skyphoi, which have prominent handles (e.g. Marchese 1995: 131, 164–165, Fig. 4.4; Guz-Silberstein 1995: 294, Fig. 6.6; Dayagi-Mendels 1999: 90). Features in common with the Hellenistic skyphoi are the relatively deep bowl and the placement of two handles close to the rim.

The overall shape, horizontal handles, and presence of decoration are similar to the Bell-shaped bowls (above). Comparable vessels have been described in relation to the Bell-shaped bowls by Dothan (1982: 105), Arie (2006: 195), and Panitz-Cohen (2009: 207), as a distinctive phenomenon. The handle of the deep bowl type BL04B is straight and small compared to the rounded vestigial handle of the Bell-shaped bowls (BL04A). The decoration includes horizontal and diagonal stripes and a zigzag-line, with no rounded spirals or other typically Philistine patterns such as a tongue or vertical lines. These bowls are small in comparison to the Bell-shaped bowls from Tel Kinrot. The clay body is tempered with large particles of chalk and small particles of other minerals, but the widely used basalt could not be macroscopically recognized, giving the vessel a slightly smoother surface than the most common wares at the site.

Parallels

Jordan Rift Valley: **Beth Shean,** Level VI, early: James 1966: Fig. 50:17.

Jezreel Valley: **Megiddo,** Stratum VIA: Arie 2006: Fig.13.68:3; Arie 2013a: 487, Fig. 12.85:3. Strata VI and IVB: Loud 1948: Pl. 85:2 (a 'type pot' for two vessels).

BL05: MB II–LB I Carinated Bowls

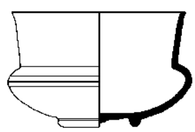


Fig. 5.18 BL05 4397/1

Several well-preserved carinated bowls with a pronounced carination (Fig. 5.18) derive from constructional fills of the Foundation Phase of the Iron I horizon and earlier layers, while other shards also appear in the Iron Age layers. The upper part is flaring and the carination is below the middle of the height. The diameter of the rim is 18–20 cm. This type is analyzed in detail in Vol. II, 1. The type can be considered a predecessor to the later carinated types (BL07 and BL08).

BL06: LB II-Style Carinated Bowls

Fig. 5.19. BL06 12111/37

There are three well preserved bowls with a clear but unpronounced carination at about the middle of the body, typical for the end of the Late Bronze Age (Fig. 5.19, App. 5A). These three bowls are very similar to each other, and therefore the type appeared as a clear one for me even though there were so few items. All three derive from well-defined loci of the Main Iron I Horizon, and should not be considered residual. These bowls are rather small, with a rim diameter of 12–16 cm and height of 7–8 cm. The lip is simple, rounded, and slightly everted. The base is a simple flat base (12111/37) or a shallow disc base (7580/1, 2). The type also appears at Tel Beth Shean in the transitional phase from the Late Bronze to the Iron Age, where it has been interpreted as a special, archaic heirloom since it was found in a foundation deposit (Panitz-Cohen 2009: 207). In addition to the three well-preserved vessels illustrated, eleven fragments can be assigned to this type. The clay of the well-preserved bowls is characterized by many small inclusions of basalt and some larger inclusions of chalk, which is the most common tempering style for local wares at the site during the Early Iron Age phases.

Distribution:
Foundation Phase: -.
Main Iron I Horizon: 7580/1, 7580/2, 12111/37.
Post-destruction Phase: - .

Parallels:
Jordan Rift Valley: **Dan,** Stratum VII: Ben-Dov 2011: 207 Bowls with moderate carination, plain BC04a: Fig. 95:3; Ben-Dov 2002: Fig.2:29:17. The "Mycenaean" Tom 387: ibid: Fig.2.54: 5 (=Biran 1994: Fig. 80:2). **Hazor,** Stratum 2: Yadin 1958: Pl. XCV: 13; Yadin 1960: Pl. CXVI: 8; Yadin 1969: Pl. CCLXXXVIII: 24–26. Stratum 1: Yadin 1958: Pl. XCVI: 3–5; CVI: 1–20; CXXVI: 26–28; Yadin 1960: Pl.CXLI: 14. Stratum 1B: Yadin 1958: Pl. LXXXV:8; Yadin 1960: Pl. CXVIII: 4, 12, 16; Yadin 1969: Pl. CCLXXII: 5 – 7, 14–15; CCXCI: 8–10. Stratum 1A: Yadin 1958: Pls. LXXXVII: 5; XCI: 11–16; Yadin 1960: CXXIV: 5–6; Yadin 1969: Pl. CCLXXIX: 21–22. Stratum XIII: Yadin 1969: Pl. CLXI: 15; CLXII: 24–26. **Tel Yin'am,** Stratum XIII: Liebowitz 2003: Figs.1:1, 4. Stratum XIIB: ibid: Figs. 6:1; 8:1–2; 9:2; 41:2. Stratum XII: ibid: Figs. 14:1; 17:1; 20:1; 23:1; 26:4. Stratum XIIA: ibid: Figs. 33:1; 35:2; 40:1; 41:2; 42:1–2. **Tel Beth Shean**, Level IX, construction (R1b): Mullins 2007: Fig. 57:13. Level IX (R1b'): ibid: Pl. 68:7; (R1a): ibid: Pls. 72:3; 74:8. Level VII: James/McGovern 1993: Fig. 33:4. Level VII/Level VI (N-4, N-3b): Bowl type 78: Panitz-Cohen 2009: 206–207. **Tell Abu al-Kharaz**, Phase XI: Fischer 2013: Fig.370:3.

Jezreel Valley: **Megiddo,** Stratum VIIB: Finkelstein/Zimhoni 2000: Fig.10.6:7, 10.12:2. Stratum VIA: Loud 1948: Pl.72:2. **Tel Qashish,** Stratum VIIA: Ben-Tor/Bonfil 2003: Fig. 104:5. Stratum VI: ibid: Fig. 112:16.

BL07A: Carinated Bowl with Upright Upper Part


Fig. 5.20. BL07A 10408/1

These bowls have a rounded lower part and a slight carination at about the middle of the body (Fig. 5.20, App. 5A). The carination is soft, unlike the pronounced carination of the carinated MB-LB bowls. The upper part is upright and the rim is simple or thickened, but not strongly modelled. The diameter of the rim is 15–24 cm, with most vessels being 18–22 mm wide. They are 8–9 cm high. The few preserved bases are small disc or ring bases, ca. 6 cm wide. The clay is tempered with small basalt particles accompanied with fewer chalk particles of medium to large size.

Most of these bowls have a plain surface. One rim fragment has traces of red slip (10396/2, not illustrated), and one has a red painted band in the middle of the upper part (14417/1). This painted bowl has thinner walls and a narrower rim diameter (13 cm wide; 7 cm high), creating a slenderer form. Two (or three) restorable bowls from area U with a simple rim are very similar to each other, probably indicating proximity of production. There are altogether 31 items of bowl type BL08A, seven of them well preserved, while most are only rim fragments (4 % in areas U/W). In the shard material, the simple rimmed bowls are sometimes difficult to separate from the rounded bowls (BL00 and BL02A).

Distribution:
Foundation Phase: 14352/8 [or Main Iron I Horizon, earlier phase, L1834].
Main Iron I Horizon: 10310/6, 10408/1, 10418/7 (not illustrated), 12139/10, 14417/1.
Post-destruction Phase: 10260/1.
Colluvium below the surface: 10220/3 (not illustrated).

Parallels
Tel Kinrot, Stratum V: Fritz 1990: Pl.94:1.

Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pls. 48:4; 50:4; 57:1. (some vessels of the hemispherical bowl type Bh2 and some of carinated bowls Bc). Stratum V: ibid: Pls. 21:2; 27:4. Stratum IVB: ibid: Pls.1:1; 19:2. **Hazor**, Stratum XII/XI: Yadin 1969: Pl. CLXIV: 19, Ben-Ami/Ben-Tor 2012: 21, Figs.1.8:5; 1.10:1. Stratum X: Garfinkel 1997: Fig.III.23:4. Stratum XB: Yadin 1969: Pl. CLXXI: 4, 7; Ben-Ami/Ben-Tor 2012: Figs.2.1: 8–9. Stratum XA: Yadin 1969: Pl. CLXXIV: 3. Ben-Ami/Ben-Tor 2012: 2.10:6. **Tel Yin'am,** Stratum XII: Liebowitz 2003: Figs.13:2; 23:2. Stratum XIIA: ibid: Fig.42:3–4. **Beth Shean**, Levels VIII: James/McGovern 1993: Fig. 15: 11, 13. Late Level VII=S-4, S-3b-a: Panitz-Cohen 2009: Pl.25:9–10; 32:18–19; 39:14; 49:6; 52:10; 65:1. Upper Level VI: James 1966: Fig. 52:18. Lower Level V: James 1966: Fig. 6:5; Fig. 18:3; Fig.19:10; 26:10; 59:4, 9, 11. Stratigraphy: ibid: 143–144. Parts of Level V (mainly upper): S-1: Mazar 2006: type BL 53: Pl.6:3, 11; 12:12–14. Level IV: James 1966: 36:4. Type BL76: Panitz-Cohen 2009: 205. **Tel Rehov,** Stratum VI: Mazar/Bruins/Panitz-Cohen/Plicht 2005: Fig. 13.18:4. Stratum V: ibid: Fig.13.23:3. **Pella,** Phase O: Smith/Potts 1992: Pl.67:6, 13. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 280: 6–7. Phase XI: ibid: Fig. 79:1; 370:1. Phase XIV: ibid: Fig. 191: 1. **Tell Deir ᶜAlla,** The Late Bronze Age Sanctuary, Phase B: Franken 1992: Fig.7-7:11. Phase C: ibid: Fig.7-8:1. Phase E: ibid: Fig. 7-16:17–21, 27, 29. Phase E1: ibid: Fig.4-2:1. Phase E2: ibid: Fig.4-6:1, 3, 5. Phase E3: ibid: Figs. 4-8:1–4, 7, 11. Phase E-4: ibid: Fig.4-14:1. Phase E-6: ibid: Fig.4-24: 1. Phase E-7: ibid: Fig. 5-3:2–4. Phase E-8: ibid: Fig. 5-5: 2, 9. Phase E-9: ibid: Fig. 5-9:1. Phase E-10: ibid: Fig. 5-13: 2–4. Phase F: ibid: Fig. 5-19:15. **Tell Deir ᶜAlla,** The Iron Age habitation, Phase A: Franken 1969: Fig.46:25 (type 4c), 30 (type 4f), Phase B: ibid: Fig.49:59 (type 4a), 65 (type 4b), 68 (type 4c); 50:78. Phase C: ibid: Fig. 54:36–37 (type 4g). Phase D: ibid: Fig. 56: 66–67 (types 4b, 4c). Phase E: ibid: Fig. 59:50–51 (type 4a), 55 (type 4c), 74 (type 5c). Phase F: ibid: Fig.61:83 (type 4). Phase G: ibid: Fig.64:49–50 (types 4e, 4f), 90 (type 5b). Phase K: ibid: Fig. 73:22. Phase L: ibid: Fig.75:4, 32 (type 4c). **Tell es-Saᶜidiyeh**, Tombs 104, 105L, 107, 109S of the earliest period: Pritchard 1980: 29, Figs. 7:3; 9:6; 10:2; 13:5. Tomb 113 of the later period: ibid: Fig. 16:1. **Tall al-ᶜUmayri**, Phase B-11B: Herr 2000: Fig.4.14:20. Phase A-8: ibid: Fig.3.23:10, 13; Phase F-6: ibid: Fig. 6:16:19. Phase A-6B: ibid: Fig.3.30:2, 4. Phase A-5: ibid: Fig.3.33:1–2.

Jezreel Valley: **Megiddo,** Stratum VIIA: Finkelstein/Zimhoni 2000: 242–243; Fig.10.2:8–9; 10.8:1 (=Loud 1948: Pl.68:13); Arie 2013: 484–485, 487, types BL5, BL6 and BL15: Figs. 12.66:1, 9; 12.72:2; 12.77:4. Stratum VIB (Level F-6): Finkelstein/Zimhoni/Kafri 2000: Figs.11.1:1; 11.6:2, 4, 7 (=Loud 1948: Pl.74:7, 8, 3). Stratum VIA (Level F-5): Finkelstein/Zimhoni/Kafri 2000: Figs.11.2:3; 11.9:2 (=Loud 1948:78:1); 11.14:1 (=Loud 1948: Pl.78:13); Arie 2006: Figs. 13.53:1; 13.63:2, 5; 13.66:3; 13.69:1; Loud 1948: Pl.78:10 (indicating four vessels from Building 2072. Stratum VB: Finkelstein/Zimhoni/Kafri 2000: Figs.11.23:20 (=Lamon/Shipton 1939: Pl.30:134). Parallels are mainly of bowl type BL4 deep carinated bowl. **Yoqneᶜam**, Stratum XVIIIb: Zarzecki-Peleg 2005: Fig.I.32:12. Stratum XVII: ibid: Fig.I.8:4; I.25:8. Stratum XVI: ibid: Fig.I.36:9. Parallels are of Types

IA, IB (Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005:237–238) and IIIA1 (ibid: 243). **Tel Qiri,** Stratum VIII: Ben-Tor/Portugali 1987: Figs. 15:1; 28:1. Stratum VII: ibid: Figs. 10:1; 27:1. Bowl group B IIIa Simple Carinated body (Hunt 1987: 190–191). **Tel Qashish,** Stratum IIIB: Ben-Tor/ Bonfil 2003: Fig.135:15. Stratum IIIA: ibid: Fig.135:6. Stratum IIB: ibid: Fig.137:3. **Ta'anach,** Period IA: Rast 1978: Figs.3:8; 8:1. Period IB, ibid: Figs. 13:2–3. Period IIA: ibid: Fig.24:8; 25:7–8.

Central Hill Country: **Shiloh,** Stratum VI: Bunimowitz/ Finkelstein 1993: Figs. 6.38:2

Phoenician Coast: **Tell Keisan,** Level 11: Puech 1980: Pl.81:16, 16a. Level 9c: Puech 1980: Pls. 80:4c; 79: 2, 2a, 10. Level 9a-b: Briend 1980: Pl.66: 4, 6, 7, 9. Level 8: ibid: Pl.55: 11a, 13, 14. Level 7: ibid: Pl. 52:2–3, 5. **Tell Abu-Hawam**, Stratum V: Hamilton 1935: Fig.290. Stratum IV: ibid: Figs. 15; 154. Stratum III: ibid: Fig. 73. **Tel Dor**, area A, 'Phase 10': Gilboa 1995: Fig.1.1:2. Area C1 (Phase 9): ibid: Fig.1.10: 11–12. Area C1 (Phase 7/8?): ibid: Fig.1.11:17–18. Ir1a|b horizon: Gilboa/Sharon 2003: Fig.6:14. Ir1b horizon: ibid: Fig. 7:7, 10–11. Area G Phase 7a: Gilboa/ Sharon/Zorn 2004: Fig. 5:5, 7, 9. Area G Phase 7a: ibid: Fig.7:17. Ir1|2 horizon: Gilboa/Sharon 2003: Fig.10:4–6. Parallels are of bowl type BL33 (Gilboa/Sharon 2003: 25) or BL20a (Gilboa 1995: 4). **Tyre,** Stratum XV: Bikai 1978: Pl. XLII: 11. Stratum XIII-1: ibid: Pl. XXXIII: 8. **Sarepta,** Stratum G1: Anderson 1988: Pl.27: 21. Stratum F: ibid: Pl.29:25. Stratum E: ibid: Pl. 31:12, 14, 16. Stratum D2: ibid: Pl. 32:16–17. Parallels are mainly of Bowl types X-27 and X-28. **Joya**, Iron Age cemetery: Chapman 1972: Fig.24:249.

Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: Fig.12:3. Stratum XI: ibid: Figs.26: 3; 28: 16, 21. **ʿIzbet Sartah**, Stratum III: Finkelstein 1986: Fig.11:2. Stratum II: ibid: Fig.18:2. **Tell es-Safi,** Phase E4b: Gadot/ Yasur-Landau/ Uziel 2012: 245, Pl. 12.2:10.

Other: **Kamid el-Loz**, Level 4 of the LB temple (Komplex F): Slotta 1980: Pl.4:12.

BL07B Carinated Bowl with Loop Feet


Fig. 5.21. Bowl 12024/1

This sub-type consists of one bowl with distinctive loop feet. The body proportions are relatively close to the Carinated Bowl with Upright Upper Part (BL07A). However, the upper part of this bowl is inverted. Bowl 12024/1 (Fig. 5.21) with three loop feet derives from surface layer (L5402). It has a wide opening (20 cm) and a slightly wider (22 cm) carination 2.5 cm below the rim. The rim is inverted and the lower part is almost straight. The bowl is 70 mm deep and there is a small ring base (5.5 cm wide), but the bowl stands on three loop feet extending below the base. There is a thin red stripe on the rim. Similar placement of three loop feet on a carinated bowl has been attested at Tel Beth Shean, level XB (Maier 2007: 250, Pl. 2:22), and on an Iron Age II thick rimmed bowl from Tell el Far'ah (Amiran 1969: 200, Pl. 63:10).

Parallels:

Jordan Rift Valley: **Dan,** Stratum XII (MBIIA): Biran 1994: Fig.23:2. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 280:17. **Tell el Ghassil**, Level I: Joukowksy 1972, Pl.1: 8 (base only, red slipped). **Hama,** Period II (GVIII): Riis 1948: 76, Fig. 118.

Jezreel Valley: **Megiddo,** Stratum VIB: Loud 1948: Pl.74:10; for the body shape: Stratum VIA: Arie 2006: Fig.13.56:1.

Philistine Coast: **Qasile,** Stratum X: Mazar 1985: 42, Fig. 40:2.

BL07C Carinated Bowl with Thick, Flat Rim


Fig. 5.22 Bowl 10433/1

This sub-type consists of one bowl with a distinctive rim and attached handles. Bowl 10433/1 (Fig. 5.22) derives from the Main Iron I Horizon (L4269). The lower part is rounded, and there is a carination on the wall 2.5 cm below the rim. The rim is 22 cm wide and the height of the bowl is 10 cm. There is a small ring base (ca. 6 cm in diameter). The bowl is of similar proportions as the two other carinated bowl types BL07A and BL07B (above). The rim is slightly inverted, thickened, and flattened from above. There are two vertically pinched knob handles on one side.

Parallels:
Jezreel Valley: **Megiddo,** Stratum VIIA: Finkelstein/Zimhoni 2000: Fig. 10.8:7 (=Loud 1948: Pl. 69:6). Stratum VIB: Arie 2006: Fig.13.51:2 (with simple rim).
Philistine Coast: **Tel Qasile**, Stratum XI: Mazar 1985: Fig.24:4 (with simple rim).

BL08A: Cup-Bowls with Inverted Upper Part

These bowls are small, relatively deep, and have an inverted upper part (Fig. 5.23, App. 5A). The diameter of the rim is narrow, usually 9–12 cm, though bowl 6172/8 is wider (16 cm). This bowl type seems to be a form of the MB II–LB I period. Two of the bowls have traces of burnish (9538/2, 6020/2), and two examples have red slip (11056/30, 9759/1). Cup-Bowl 5062/30 (deriving from an Iron Age context) has black painted horizontal bands. The clay includes particles of chalk and traces of organic temper, while other minerals are less clearly recognizable. These bowls appear as a predecessor to the wider type on inverted bowls that continue into Iron Age (BL08B below). This type will be discussed in detail in the report of the Bronze Age finds.

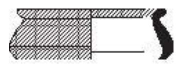


Fig. 5.23 Bowl 11056/30
2.5 cm
L9899-1105630

Distribution:
Stratum VII: 5379/2 (G4); 6172/8, 6319/4, 6104/18 (H3); 9538/1, 9538/2, 9561/1 (R3), 11056/30.
Foundation Phase of the Iron I: 5062/30 (G3).
Ottoman Wall W6253, stratum R0: 9759/1; *Surface, (H0)*: 6020/2.

Parallels
Jordan Rift Valley: **Dan,** MB tombs: Stratum XIII: Ilan 1996: Fig.4.90:2. Stratum XII: ibid: Fig. 4.104: 8–15. Stratum XI: ibid: Fig. 4.99: 17. **Hazor,** Stratum 4: Yadin 1958: Pl. CXIX: 26–27. Stratum 3: Yadin 1960: Pl. CIX: 39–42. Burial 4021 (Post-Stratum XVI): Yadin 1969: Pl. CCXXXVI: 6–7. Stratum 2: Yadin 1958: Pl. XCV:3; Yadin 1969: Pl. CCLXXXVIII:28. Tomb 8144 (Stratum 1B): Yadin 1960: Pl. CXXX: 1. **Tel Beth-Shean**, Level XI: Maier 2007: Pl. 16: 1–2, 13; 17:3. Level XI–XB: ibid: Pl 9: 10–12 (type BL 26, closed carinated bowls). **Tall al-Umayri**, Phase B-11A: Herr 2000: Fig.4.31:18.

Jezreel Valley: **Megiddo,** Stratum XII: Ilan/Hallote/Cline 2000: Figs. 9.1:6; 9.5: 4–5. **Yoqneᶜam,** Stratum XXIII: Livneh 2005: Fig. II.36:19.

BL08B: Bowls with Inverted Upper Part

Six bowls have an inverted upper part wider than the Cup-bowls (BL08A, above), and I have grouped them together even though they do not form a clear-cut type. These form a group of vessels between the cup-bowls (type BL08A) and the Cyma-profiled bowls (BL09), both in morphology and in chronology. They have a rounded carination about at the middle of the body, an inverted upper part, and usually a slightly everted rim. The rim is 15–18 cm wide. The bowl 6149/1 is red slipped and hand-burnished, and has handles extending from the rounded shoulder. This bowl is of fine ware, with no visible inclusions. Bowls 6445/1, 10566/6 (Fig. 5.24) and 11056/32 of the type BL08B have a clay with basalt, quartz, and chalk inclusions. Tempering is thus of a style common for Iron Age material at the site. This type is analyzed in detail in vol. II, The Bronze Age Finds. However, three out of five of the well-preserved items derive from stratified Iron Age contexts, so the type may continue to Early Iron Age.

Distribution:
Stratum VII: 11056/32 (L9899), *LB-locus* 2901: 5816/3.
Foundation Phase: 6149/1 (fill of H2).
Main Iron I Horizon: 6445/1.
Later Phase of the Main Iron I Horizon: 10566/6.

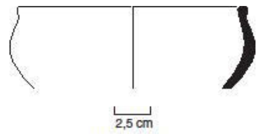


Fig. 5.24 Bowl 10566/6

Parallels
Jordan Rift Valley: **Dan,** Stratum VIIA: Ben-Dov 2011: Fig. 70:2; 74:5. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 280: 15.

Jezreel Valley: **Megiddo,** Stratum VIII: Ilan/Hallote/Cline 2000: Fig. 9.10:14. Stratum VIIA: Finkelstein/Zimhoni 2000: Fig. 10.10:4 (=Loud 1948: Pl. 65:7). **Yoqneᶜam,** Stratum XXIV: Livneh 2005: Fig. II.10:1.

BL09: Cyma-profiled Bowls


Fig. 5.25 Bowl 10410/11

This bowl type has been considered a hall mark of the Early Iron Age in Palestine, and it shows at the same time a continuation from the degenerated carination of the LBII bowls. This is one of the most common bowl types from the Iron Age at Tel Kinrot (the third most common bowl type), and its distinctive form is chronologically significant. There is a carination or a marked curve on the wall of the bowl. The lower part is rounded and the upper forms a gutter (Fig. 5.25, App. 5A). The curve takes place at the middle of the height or above the middle, close to the rim. The sharpness of the curve varies. The rim is flaring and the lip is simple or thickened. These bowls are relatively big, usually 25–40 cm in diameter. However, the width varies considerably, from 18 cm to over 40 cm (Figs. 5.26–27). Variation in size of such bowls is evident also at other sites, such as Megiddo (Arie 2013: 484). Cyma bowls BL09 overlap in size with the vessels usually considered as kraters (below), and the form of these bowls is close to that of the Carinated kraters (KR04). The base is a ring or disc base. There is no surface treatment or decoration, except for one vessel with a red band on the rim (10308/22).

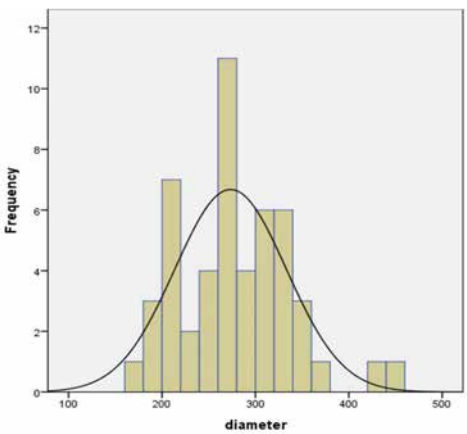
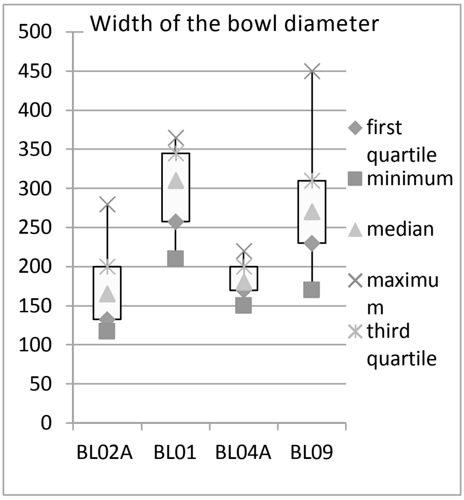


Fig. 5.26. Histogram of the diameter of the Cyma-profiled bowls (BL09) with a normal curve (n=50).



In addition to the 20 vessels listed below, there are several fragments from the Iron Age contexts at Tel Kinrot. Altogether 69 bowls have been identified as Cyma-profiled bowls (50 items from areas U/W, where they make 9 % of bowls). One bowl from the Foundation Phase has applied zoomorphic figurines on the rim (see Nissinen & Münger 2009). The vessel is analyzed in detail by Saarelainen (forthcoming).

Fig. 5.27. Box plot of the rim width of well-preserved rounded bowls (BL01, n=10; BL02A, n=18), all Bell-shaped bowls (BL04A, n=13) and Cyma-profiled bowls (BL09, n=63). The figure includes the material from the 90's excavations and from the KRP excavations.

Distribution:
Foundation Phase: 6451/1, 6474/1 (with applied figurines, same with 6603/1).
Main Iron I Horizon: 6866/1, 7789/1, 8166/5, 8188/1, 8193/6, 8207/1, 8432/1, 9272/1, 10410/11, 10571/24, 10572/1 (not illustrated), 11573/4, 11578/3, 12073/7, 12120/9.
Main Iron I Horizon, later phase: 10539/1 (not illustrated).
Post-destruction Phase: 4103/1, 10260/2, 10231/5 (not illustrated).

Parallels:

Tel Kinrot, Stratum V: Fritz 1990: Pl.57:2. Stratum IV: ibid: Pl.59:1.

Jordan Rift Valley: **Dan,** Stratum VIIA: Ben-Dov 2011: Fig. 120: 1, 4. Stratum VI: Ilan 1999: 71; Pls. 45:3; 46:3; 48:5; 51:3; 60A:3. Stratum V: ibid: Pls. 25:1027:2; 31:7; 34:1; 36:2–3; 41:3. Stratum IVB: ibid: Pls. 2:5; 20:1 (lower). Hazor**,** Stratum XII/XI: Ben-Ami/Ben-Tor 2012: 21, Figs. 1.3:4; 1.5:1; 1.8:1–3; 1.10:7–8, 12–16; Yadin 1969: Pls. CLXIV: 11–18; CLXX:1–5; CCI: 4–5, 7; CCIII: 3. Stratum XI–X: Yadin 1969: Pl. CLXIV:1. **Tel Yin'am,** Stratum XII: Liebowitz 2003: Fig.11:2–3. Stratum XIIA: ibid: Fig.28:1. **Beth Shean,** Level IXB: Mullins 2007: 416, Pl. 68:11. Level VII: James/McGovern 1993: Fig.20:1. Late Level VII=S3b-a: Panitz-Cohen 2009: Pl.39:15; 46:4. Late Level VI/parts of V: Panitz-Cohen 2009: Pls.69:2; 72:1. Level VI (Stratum 4): Yadin/Geva 1986: Fig.22:12–13, 15. **Tel ᶜAmal**, Niveau IV: Levy/Edelstein 1972: Fig.15:17. Niveau III: ibid: Fig. 15:14. **Tel Rehov,** Stratum VII (D-4): Mazar/Bruins/Panitz-Cohen/Plicht 2005: Fig.13.7:3. **Pella**, Phase II: Smith/Potts 1992: Pl.47:12. Phase IB: ibid: Pl.49:6. Phase IA: ibid: Pl.51:9–10. Phase O: ibid: Pl.67:2, 12. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 280: 16. Phase XII: ibid: Fig. 21:6; 82:7. **Tell Deir ᶜAlla,** The Late Bronze Age Sanctuary, Phase F: ibid: Fig. 5-18:16–18. **Tell Deir ᶜAlla,** The Iron Age habitation, Phase A: Franken 1969: Fig.46: 33–34 (type 4g). Phase B: ibid: Fig.49:79 (type 4g), 81–82 (types 4g, 4e), 88 (type 4f); 50:8 (type 4h), 62–65 (type 14). Phase C: ibid: Fig. 54:38–40 (type 4h), 85–86 (type 14). Phase D: ibid: Fig. 56:70 (type 4f). Phase E: ibid: Fig. 59:75 (type 5d). Phase F: ibid: Fig. 61:70 (type 5f). Phase H: ibid: Fig. 67:19–20 (type 5f). Phase J: ibid: Fig.69:72 (type 5h). Phase K: ibid: Fig. 71:86 (type 5f). Phase L: ibid: Fig.75:8 (type 4f), 36 (type 5f). **Tall al-ᶜUmayri**, Phase A-9: Herr 2000: Fig. 3.12:25–26.

Jezreel Valley: **Megiddo,** Stratum VIIA: Loud 1948: Pl.72:1; Arie 2013: 483–484, Figs. 12.62:3; 12.66:6; 12.67:3. Stratum VIB: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.6:9 (=Loud 1948: Pl.74:6). Stratum VIA (Level F-5): Finkelstein/Zimhoni/Kafri 2000: Figs.11.2:2; 11.9:6, 9 (=Loud 1948: Pl.78:5, 4); 11.14:5 (=Loud 1948: Pl.78:12); Arie 2006: Figs. 13.63: 3–4; 13.66:4; 13.68:1; Arie 2013: Fig. 12.74:2; 12.76:1; 12.77:2; 12.91: 3–4. Stratum VI: Loud 1948: Pl.84:17. **Yoqneᶜam,** Stratum XXIII: Livneh 2005: Fig. II.36:9. Stratum XVIIIb: Zarzecki-Peleg 2005: Fig.I.32:13. Stratum XVIIIa: ibid: Fig.I.3:4. Stratum XVIII: ibid: Fig.I.6:8–9. Stratum XVII: ibid: Figs.I.2:2; I.12:4; I.14:5; I.19:13–15. Parallels from the Stratum XVIII on are assigned to Type B IIIA1 (Zarzecki-Peleg/ Cohen-Anidjar/Ben-Tor 2005: 237–238). **Tel Qiri,** Stratum IX: Ben-Tor/Portugali 1987: Fig.20:1. Stratum VIII: ibid: Fig. 15:1. The parallel group is the Bowl group B IIIc Carinated body with Bevelled rim (Hunt 1987: 190–191). **Tel Qashish,** Stratum IV: Ben-Tor/Bonfil 2003: Fig.131:2. **Ta'anach,** Period IB: Rast 1978: Figs. 13:13–14.

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Fig. 6.57:1 is a close parallel to Bowl 7789/1 at Tel Kinrot.

Phoenician Coast: **Tell Keisan,** Level 11: Puech 1980: Pl.81: 15, 15a. Level 9c: ibid: Pl.79: 4, 5c, 6, 6a, 7, 7a–7d, 8, 8a–b, 9a–f. Level 9a-b: Briend 1980: Pl.66: 2g–h. **Sarepta,** Stratum G1: Anderson 1988: Pl.27: 19.

Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: Figs.11:7–8; 12:9, 12, 14–29; 15: 22, 28–29; 16:2–3, 5, 15–16. Stratum XI: ibid: Figs. 22:16–19; 24: 9–10; 28: 22–29, 31–35; 29:2–5. Stratum X: ibid: Fig.33:15, 24; 39: 20–22; 44:3.Parallels are of bowl type BL 8 (Mazar 1985: 39–41). **ʿIzbet Sartah**, Stratum III: Finkelstein 1986: 48–55, Fig. 12:1. Stratum II: ibid: Fig.14:1, 17; 18:1. Stratum I: ibid: Figs. 21:14; 24:1. **Tell es-Safi,** Phase E4b: Gadot/ Yasur-Landau/ Uziel 2012: Pls.12.1.12–13. Stratum E3 (pits): Zukerman 2012, 276: 276, Pls.13.2:4 Stratum A5: ibid: Pl.13.5:3; 13.6:6. Phase A4: ibid: Pl.13.9:1. Phase Pre-A3: ibid: Pl. 13.12:12. Stratum A3 (?): ibid: Pl.13.10: 9–11. Parallels from the Iron Age Tell es-Safi are of type 310.1.

BL10 Miniature bowls

Three miniature bowls form a distinctive group because of their small size, indicating a similar function. However, they vary as to their form. They all have flat bases. Bowl 4217/1 (Fig. 5.28) has a thinned rim and thick, flat base. Bowl 7513/2 (App. 5A) is a flaring bowl with a small flat base, formed on the wheel. It is 9 cm wide and 3 cm high. Bowl 8330/1 is a crude handmade bowl, probably formed by pinching. Based of the form, this vessel could also be considered a crucible. However, the surface does not indicate contact with fire or heat. The form is that of a very shallow cylinder, 5.5–6 cm wide and 1.5–2 cm high. Bowl 8775/1 (Fig. 5.29) is a rounded bowl with thickened rim and flat base. It is 5.5 cm wide and 2.5 cm high. All the miniature bowls have tempering of small basalt and medium to coarse chalk particles.

Three out of the altogether four miniature bowls were found in area K, local stratum 2 (the Main Iron I Horizon). The contexts of these bowls were domestic. Bowl 8330/1 was found together with common household vessel fragments, such as a cooking pot (L5074; Bush & Sasse 1998). The function of miniature bowls has been assumed to be cultic, and they are often called "votive" (Mazar 1980: 117–118; Epstein & Dothan 1989: 239; Bonfil 1997: 83; Mazar & Panitz-Cohen 2001: 54; Maier 2007: 283–284; Panitz-Cohen 2009: 208). The connection to cult practices is based on large groups of miniature vessels, foremost bowls from the Late Bronze Hazor, area H (Epstein & Dothan 1989) and Early Iron Age Qasile (Mazar 1980) temples. The practice of giving votive offerings has been discussed in general by Frevel (2008), and in relation to cult stands by Kletter (2010). Considering the groups of miniatures from the temples, a connection to cult seems plausible. A group of votive vessels found with a kiln at Deir el-Balaḥ probably relates to some use in a funerary context (Dothan 1981: 129). Tuffnell proposed that miniature bowls may be toys (1958: 183). Since the interpretation as votive vessels would require some evidence for a cultic context, I decided to avoid this interpretative coinage.

Fig. 5.28 Bowl 4217/1.

Fig. 5.29 Bowl 8775/1

Distribution:
Foundation Phase (?): 4217/1 (Area H, L3109, artificial fill close to the topsoil)
Main Iron I Horizon: 7513/2, 8330/1, 8775/1 (Area K, loci 5121, 5074, 5268).

Parallels:
Jordan Rift Valley: **Hazor,** Stratum XVII (9D): Bonfil 1997: Fig. II.7:5. Stratum XVI (9b): ibid: Fig. II.12:13. Stratum 2: Yadin 1969: Pl. CCLXIX: 1–6, 10, 14–17. Stratum XV: Yadin 1969: Pl. CLVII: 9–10; 35. Stratum XIV (8): Bonfil 1997: Figs. II.18:22; 21:8; 24:10; 25:4–7, 22; 28:8; Stratum XIV–XIII: Yadin 1969: Pl. CLX: 22–23; CLXIII: 16. Stratum 1B: Yadin 1960: Pl. CXXIII: 23–24. Stratum 1A: Yadin 1958: Pl. LXXXVIII: 17–18. **Beth Shean,** Level VI early (S-3b, S-4): Panitz-Cohen 2009: 207–208, Pls.15:24; 25:15. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 280:4.
Jezreel Valley: **Yoqne'am**, Strata XXV–XIX, especially common in strata XXI–XIX: Ben-Ami/Livneh 2005: 260, Fig.IV.3:13; Stratum XXa, Tomb 2426: Ben-Ami 2005: Fig.III.11:13. Stratum XXb: ibid: Figs. III.1: 9–11; III. 2:19.
Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: 38, Fig.11: 15–18. Stratum XI: ibid: Fig. 19:4–27. Stratum X: ibid: Fig.33: 27, 29–30, 32.

Various bowls

A) One wide and shallow bowl fragment with a stump foot (5521/1) derives from surface. It has thick and straight, almost upright wall. Close parallels were not found.

Fig. 5.30 Bowl 5521/1

Parallels
Jordan Valley: **Beth Shean,** Pre-Level IX (R-2): Mullins 2007: 414–415, Pls. 39:3; 42:9. The parallels have three similar feet but the bowls are smaller and the bowl is shallow and rounded. **Tell Abu al-Kharaz**, Phase XIV: Fischer 2013: Fig. 193:3.
Jezreel Valley: **Yoqneᶜam**, fill: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 253, Fig. II.10:4.

B) One large, rounded bowl with red slip and burnish on both surfaces (6502/1) derives from the Main Iron I Horizon. The rim is 35 cm wide and the vessel was over 10 cm high. The lip is cut and thickened inside.

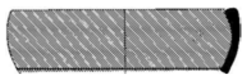


Fig. 5.31 Bowl 6502/1

C) Two bowl fragments with straight walls were found in stratified contexts of the Iron Age. Bowl 6010/1 has red slip on both surfaces.

Fig. 5.32 Bowl 6010/1

Distribution:
Stratum VII (or Foundation Phase): 5829/10; *Foundation Phase:* 6010/1; *Surface:* 10215/1.

D) A straight sided bowl with inside thickened ledge rim (12127/3) derives from the Main Iron I horizon. The mouth is 27 cm wide and the lip is 20 mm thick. The wall below the lip is also thick (11 mm).

E) An upper fragment of a bowl with straight sides and a strong angle (4808/5) has red slip on the interior. The vessel derives from Locus 1800 or Locus 1814 (thus it is somewhat unclear if it should be considered as a late context or a floor of the Main Iron I Horizon).

F) One rim fragment of a bowl (10286/2) has a thickened rim and a grooved upper profile. The rim is 160 mm wide. The fragment derives from a natural fill close to the surface.

G) Bowl rim 12067/2 is a thin-walled vessel of fine ware with red painted horizontal bands and a burnished surface. The shard may be considered to be "Samaria"-ware. It derives from a natural fill below the topsoil.

Chalices

Chalices are footed bowls. There is some variability in the vocabulary used to refer to the parts of the chalices. The cylindrical support of the bowl is most commonly called a foot (e.g. Amiran 1969: 95; Mazar 1985: 48–49; Arie 2006: 199; Panitz-Cohen 2006: 53–54; Faßbeck 2008; Ben-Ami & Ben-Tor 2012: 23; Martin 2013: 366), but sometimes base (Liebowitz 2003: 117; Arie 2006:199; Panitz-Cohen 2009: 209), stem (Panitz-Cohen 2009: 210), leg (Arie 2013: 493; Gadot et al. 2014), or pedestal (Grutz 2007). Grutz indicates by pedestal the upper part of the support, while reserving the term 'foot' for the lowermost part of the vessel (2007:2, 106–117). As the lower part of the chalice is generally considered to have been produced in one piece, and there is no specific need to divide it into sub-parts and no clear point for such a division in the vessels, I prefer to refer to the whole of the lower part of the vessel as a foot. There is even more variation in the terms used to describe the rim part.

Footed bowls appear in Israel/Palestine during the Middle Bronze Age IIB–C, when the bowl form is similar with the bowls of the period, the foot height making the difference (Amiran 1969: 95). The footed bowls of the Middle Bronze Age II and Late Bronze Age I generally have rather low feet (or pedestals), their height being less than half of the whole height of the vessel (Amiran 1969: 95, 129–134; Mullins 2007: 413). The high feet start to appear during the Late Bronze Age (e.g. Amiran 1969: pl.40: 12–15; Panitz-Cohen 2006: 53–54). During the Late Bronze Age, the two traditions start to diverge, so that the rounded and wide bowls appear with different bases and also footed, but the carinated form is mostly combined with ring or disc bases (Tufnell 1958: 184, Pl.72; Yadin 1960: Pl. CXVIII; Yadin 1969: Pls. CCLXIV: 1; CCLVXXIII: 1–3; CCLXXX: 3–4; Amiran 1969, Pls. 38–40). During the Iron Age – the high season of the chalices – the chalice-bowls often have distinctive rim and body shapes compared with those of bowls on low bases, although there is still some overlap as well, especially within the rounded chalices and bowls. The chalice-bowls tend to be shallower than common bowls. The flaring rims typical for everted chalices do not appear on bowls.

Fig. 5.33 Chalices from the KRP excavations at Tel Kinrot. Photo by TT.

Chalices are usually made of two parts, of which at least the bowl has been wheel thrown, while the foot may be coiled on a tournette or thrown on the fast wheel (Gadot et al. 2014: 63; Panitz-Cohen 2010: 121). The joining of the hollow foot to the bowl has sometimes been strengthened with a piece of extra clay at the base of the bowl, leaving the join thick. Chalice 12731/1 (see Appendix 5B) has a cone of clay at the base of the bowl, left inside the foot, reminiscent of a combination of bowl and stand at Qasile (Mazar 1980: 96–100) and (bowl of a chalice or part of a combined stand and bowl) at Tell el-Farah (N) (Chambon 1980: pl. 60:7). The large chalice fragment 10304/9 has added clay at the base of the bowl, apparently to strengthen the joint. Such added clay might have been smoothed in those chalices where the join of the bowl and foot appears thick, leaving the upper part of the foot solid (e.g. 8179/1, 8254/1, 12816). Such a thick joint is typical for the rounded chalices. In all carinated chalices and some rounded examples the join is slender, leaving the bowl 'to sit' on the foot (e.g. 10381/1, 10743/1 and 10419/1). This is also the point of breakage in many cases (e.g. 7666/1, 10498/1 and 8339/1). Grutz suggested that chalices with a thick uppermost part of the foot would have been thrown in one piece (2007). This might be the case for chalice 14017/1 from Tel Kinrot, which has an extremely thick (over 7 cm) solid part at the upper part of the foot.

The foot is at least half of the full height of the vessel. The height of the foot has been measured from the point where the bowl wall and the uppermost end of the foot join. This point usually is slightly lower than the bottom of the bowl. The form and size of both the bowl and the foot varies. There are rounded and everted bowls and ridged, flaring, and trumpet feet. Unlike the modularity suggested by Panitz-Cohen for material from Yavneh (2010: 121), there is a pattern of combining certain kinds of bowls and feet at Tel Kinrot. At Tel Kinrot, the rounded bowls tend to have a foot ridged in its lower part, while the everted bowls are combined with a smoothly flaring foot that may have a ridge at the upper end, just below the joining of the foot to the bowl. It is probably of chronological significance that the inverted rim with triangular section common at Tel Beth Shean Lower Level VI (Panitz-Cohen 2009: 210), Tel Yin'am Stratum XII (Liebowitz 2004: 117–118), Megiddo VII (Finkelstein & Zimhoni 2000: Fig.10.10:9), Tel Qiri strata IX–VIII (Hunt 1987: 198–199), and Yoqneᶜam strata XVIII–XVII (Zarzecki-Peleg et al. 2005: 257) has *not* been found at Tel Kinrot. The Tel Kinrot chalices are undecorated, except for one painted foot fragment, traces of red slip on one shard and the elaborate decoration on chalice 9595/1.

Maier & Shai suggested a development of chalices into a more homogeneous group over a larger area (2006). Grutz developed a general typology for chalices in Israel/Palestine (2007). However, his division between straight sided and rounded bowls was extremely fluid (Grutz 2007: 104; 113). Grutz considered the direction of the rim as the first criteria in his typology (2007:1). However, it is reasonable to make the distinctions according to several coinciding features, as far as it is possible. With the material at Tel Kinrot this is the case, as the bowl form and the rim direction co-varied. Therefore, I did not take Grutz's typology as a starting point. However, in general the Rounded chalices (CL01) at Tel Kinrot would for the most part coincide with his Chalices with inverted rim and rounded or straight sided bowls (Types 111 and 113, Grutz 2007: 103–105), while the Everted, carinated chalices (CL02A) at Tel Kinrot would largely correspond with his Everted Plain rim with Carinated bowl (Type 212) and the Flaring chalices at Tel Kinrot (CL02B) would resemble his type of everted plain rim with straight-sided bowl (Type 213) (see Grutz 2007: 107–109). No chalices that would parallel his group of Chalices with vertical rim (Grutz 2007: 116–117; Fig. 8.3) have appeared at Tel Kinrot.

The rounded chalices have rim forms in common with simple rounded bowls (BL02A). Therefore, there is a risk of small rim fragments getting mixed between rounded bowls and chalices. I have preferred classifying the unclear rims as bowls, as chalices are a distinctive kind of bowl as well. Fourteen whole or almost whole vessels derive from the Tel Kinrot Iron Age phases. In addition, there are seven fragmentary chalices with at least traces of both parts preserved, and 93 smaller fragments. Most small fragments are from the foot or the joining part of the foot and bowl, and are thus securely identified as chalices. In addition, 20 rim shards have been identified as chalices, though some of them may actually derive from rounded bowls. Several of the bowls have a blackened inner side of the bowl, or dark spots in the bowl indicating contact with fire, burning, or heated materials. However, this is not always the case, and these use-related traces appear on different types of chalices, indicating no constant pattern of use related to the morphology. Zwickel opposed the identification of chalices as incense burners because of the lack of traces of burning inside the bowls (Zwickel 1990: 149–152). However, traces of contact with fire have been reported for chalices on many occasions (Chambon 1984: Pl.60; Hunt 1987: 198; Arie 2006: 199; Panitz-Cohen 2010: 120; Zukerman 2012: 280; Gadot et al 2014).

CL01: Rounded Chalices

Fig. 5.34 Chalice 12816/1

The bowl is rounded and simple. The chalices are mostly 15–18 cm high and 15–19 cm wide at their rim diameter. A few bowls are only 13 cm wide, and even 25 cm wide bowls (12111/34, App. 5B) appear. In addition, there is one very large chalice bowl base and a rim from the same basket that most likely belong together (10304/9 and 11, App. 5B), where the diameter of the bowl is 34 cm. The depth of the Rounded chalice bowls is 4–7.5 cm. The rim part is turning gently up or slightly inwards. The lip is most commonly simple, sometimes thickened inside (12816/1 in Fig. 5.34, 14265/1), rarely modeled (10419/1). The join of the bowl and foot is often thick. The foot is 8–12 cm high and varies in its lower part. Most commonly the foot is stepped (6964/1, 9604/1, 12816/1), but there are simple trumpet feet (8179/1) and high, flaring feet (7650/1, 10419/1) as well. The part where the bowl and foot join is smooth, without a ridge. The chalice 14017/1 has an exceptionally high solid part at the uppermost part of the foot, and may have been thrown in one piece (raising first the bowl on a thick, solid stem and cutting the lower part of the foot from a leather-hard vessel). The chalice 10419/1 has an incised groove in the middle of the rim and faint traces of red slip, best preserved at the inner side of the foot, close to its rim. The bowl of this chalice is blackened from the interior.

Altogether I have assigned 20 vessels to the Rounded chalices. I included shallow, rounded bowl fragments 7666/1, 11568/1, 12111/34, and 14265/1 in CL01 because the shallow bowl form with inverted rim is typical for chalices and has not been attested on well preserved bowls at Tel Kinrot. However, this assignment remains uncertain. The clay body is usually tempered strongly with small to medium sized basalt particles, and to lesser extent with medium to coarse sized chalk particles, thus aligned to the most common ware at the site, and the color is light brown. Rounded chalices appear already during Late Bronze Age II and continue to the Early Iron Age, when they are popular (e.g. Amiran 1969: 213; Grutz 2007). Most of rounded chalices derive from the Main Iron I Horizon; one is from Post-destruction Phase. This bowl, however, lacks the foot. Chalice 7650/1 lacks the rim, but the lower part of the bowl fits best the rounded type.

Distribution
The Main Iron I Horizon: 8179/1, 8254/1, 9604/1, 6964/1, 11568/1 (?), 12816/1.
The Main Iron I Horizon, earlier phase: 10304/11, 10419/1, 10978/7 (not illustrated), 12111/34 (?), 14017/1.
The Main Iron I Horizon, later phase: 10498/1.
Post-destruction Phase: 7650/1, 7666/2, 14265/1 (?).

Parallels
Tel Kinrot, Stratum IV: Fritz 1990: Pl. 84:1, 2.

Galilee: **Khirbet Tuleil**: Aharoni 1957: Fig. 5:1.

Jordan Rift Valley: **Dan**, Stratum V: Ilan 1999: Pls. 24.5, 9; 27:6; 32:1; 36:6. Stratum IVB: ibid: Pls. 11:3; 13:12; 15:5; 16:3, 4, 14. **Hazor**, Stratum 1B: Yadin 1960: Pl. CXVIII: 21–22; Yadin 1969: Pl. CCLXXIII: 1. Stratum 1A: Yadin 1969: Pl. CCLXXX: 3–4. Stratum XII/XI: Ben-Ami/Ben-Tor 2012: 23, Fig. 1.8:7. **Tel Hadar**, Stratum IV (pers. comm Yadin/Kochavi). **Tel Yin'am,** Stratum XIIB: Liebowitz 2003: 118; Fig.6:5. Stratum XII: ibid: 19:2. **Tel Beth Shean**, Level VIII: James/McGovern 1993: Fig. 16:11–12. Level VII: ibid: 20:3. Level VI: Type CH71 (S3a/S-2): Panitz-Cohen 2009: 210, Pl.66:7. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 282: 1–2. **Tell Deir Alla,** Phase B: Franken 1969: Fig. 48:54. Phase E5: Franken 1992: Fig. 4-20:10; Phase E10: ibid. Fig. 5-13:7. Phase G: Franken 1969: Fig. 63: 27–28.

Jezreel Valley: **Megiddo,** Stratum VI: Loud 1948: Pl.87:8. **Yoqneᶜam,** Stratum XVII: Zarzecki-Peleg 2005: Figs. 1.14:8; 1.19:20. **Taᶜanach,** Period IA: Rast 1978: Fig. 89:5.

Phoenician coast: **Dor,** Iron Ib Horizon (Phase G7a): Gilboa/Ilan/Zorn 2004: Fig. 9:11. **Tell Abu-Hawam (LB)**: Grutz 2007: Fig.8.2.1.1a:1

Philistine Coast: **Tell Qasile**, Stratum XI: Mazar 2985: 48, Figs. 14:6; 27:19. Stratum XI–X: ibid: Fig. 32:6.

CL02 Everted Chalices

I have divided everted chalices into two sub-types according to the bowl form. The distinction between the Everted, carinated (CL02A) and Flaring (CL02B) chalices is not sharp. In addition, one exceptional vessel appears as a third type. The foot attached to the flaring bowl is rather high and flaring towards its rim without steps. It is noteworthy that no red slip or burnish occurs at Tel Kinrot, though this form of a chalice appears red slipped at some sites, such as Yoqneᶜam stratum XVII (Zarzecki-Peleg et al. 2005: 259; Fig. I.14:11), and the somewhat later assemblages at Tel ᶜAmal stratum III (Levy & Edelstein 1972, Fig. 16:1), Tel Rehov stratum V

(Mazar et al. 2005: 225, Figs. 13.23:7; 13.24:4), and Tell el-Farah (N) Level VIIe (Chambon 1984: Pl. 60: 8–10).

CL02A Everted, Carinated Chalices

Fig. 5.35 Chalice 10381/1.

These chalices have a splayed, strongly everted rim forming a slightly diagonal ledge (Fig. 5.35, App. 5B). The bowl is carinated about at the middle of the bowl. The lip is simple or thickened, rarely cut (9252/1). The sharpness of the carination varies from gentle (8510/1) to almost straight angle (9525/1). The whole vessels are 15–18 cm high. The diameter of the rim of the bowl is 13–19 cm wide and the bowl is 5–8 cm deep. Rim fragment 10410/4 seems to be much wider (30 cm), but the small size of the rim shard precludes firm conclusions of the size of the whole vessel. The joining of the bowl and foot is thin, with no added clay strengthening the join. In chalices 6464/2 and 11238/1 there is a prominent ridge at the uppermost part of the foot just below the point of joining it to the bowl, while in chalices 8510/1 and 10381/1 there is a slight ridge at the join. The foot is 8–11.5 cm high. Unlike at many other sites, like Taᶜanach and Tel Rehov, the carinated chalices at Tel Kinrot do not have stepped feet (see Rast 1978: Fig. 53:5; Grutz 2007: Figs. G1–G3). These chalices mostly derive from the Main Iron I Horizon, though few vessels are earlier. The clay body is dominated by the small basalt inclusions, accompanied by a few larger chalk inclusions, but a few vessels have been tempered with a mixture of quartz, chalk, and mixed minerals (sand). This chalice type is generally later than the rounded type, though they coexist at many sites. At Tel Kinrot this type appears already during the Foundation Phase, making this type the earliest at the site – which is in contrast to the general picture (Grutz 2007: 19–20). Altogether fourteen chalices have been assigned to this type.

<u>Distribution</u>
The Foundation Phase: 6464/2 (?), 11238/1 (or earlier, phase R7b).
The Main Iron I Horizon: 8510/1, 8485/1, 9252/1.
The Main Iron I Horizon, earlier phase: 10381/1, 10410/4, 10743/1, 12307/2.

<u>Parallels</u>
Tel Kinrot, Stratum IV: Fritz 1990: Pl. 84:8 (se also Münger 2005: 8–9).

Jordan Rift Valley: **Dan**, Stratum V: Ilan 1999: Pl. 29:3. Stratum IVB: ibid*:* Pl. 13:6. **Hazor**, Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Fig. 1.8:6. **Tel Beth Shean**, Lower Level VI (S-3b): Panitz-Cohen 2009: 209, Pl.43:3. Late Level VI: James 1966: Fig. 50:8. Lower Level V: James 1966: Figs. 19:21; 22:22. **Tel ᶜAmal**, Stratum III: Levy/Edelstein 1972: Fig.16: 3 (stepped foot). **Tel Rehov**, Stratum VI: Mazar et al. 2005: Fig.13.18:7. Stratum IV: Fig. 13.35:9. **Tell Deir Alla**, Phase J: Franken 1969: Fig. 69:28.

Jezreel Valley: **Megiddo,** Stratum VIA: Arie 2006: Figs. 13.53:3. **Yoqneᶜam,** Stratum XVII: Zarzecki-Peleg 2005: Fig.1.9:5 (with fenestrated foot). Stratum XIV: ibid. Fig. 1.45:27. **Tell Qiri,** Stratum VIII: Ben-Tor/ Portugali 1987: Fig. 28:9 (painted and slipped). **Tell el Far'ah (N),** Level VIIb: Chambon 1984: Pl. 60: 6 (with pale slip).

Phoenician Coast: **Tell Keisan,** Level 9c (Pit 6067) Puech 1980: Pl. 80:1. Level 6: Briend 1980: Pl. 49:6.

Philistine Coast: **Tell Qasile,** Stratum XI–X: Mazar 1985: 48–49, Fig. 32:4–5. Stratum X: ibid: Figs. 40:8–9; 47:9. Stratum IX: ibid: Fig. 52:15. **ᶜIzbet Ṣarṭah,** Stratum II: Finkelstein 1986: 44, Figs. 15:6–7. **Tell es-Safi/Gath**, Phase A4: Zukerman 2012: 280, Pl.13.15:15.

Shephela: **Tel Batash/Timnah**, Stratum IV: Mazar/Panitz-Cohen 2001: 55–56, Pls. 82:15; 85:7. Stratum III: ibid: Pl.14: 13. Stratum II: ibid: Pl.56: 1–2. **Lachish** Sanctuary, Stratum V: Aharoni 1975: Pl. 42:17, 20–21.

CL02B Flaring Chalices


Fig. 5.36 Chalice 12698/1

These chalices have a shallow rounded bowl (ca. 5 cm deep), a strongly flaring rim, and a simple, rounded lip. The rim diameter is usually 17–19 cm wide, but rim fragment 10244/2 indicates a wider diameter (30 cm) – as in the other types above as well. Chalice 12698/1 (Fig. 5.36) is 17 cm high, and the other well preserved chalices are 17 and 18 cm high. The foot is smoothly flaring towards its base. This separates the flaring chalices at Tel Kinrot from many other flaring chalices, such as those at Taᶜanach (Rast 1978: Fig. 27:2) and Tel Rehov (Grutz 2007, Figs. G1–G2). The joining of the bowl and foot is slender in chalices 12698/1 and 10540/1, while in chalice 12731/1 there is a clay cone at the bowl base, left inside the short (8 cm) foot. This vessel is also tilted, indicating a careless finish. The clay body is rather strongly tempered with basalt or quartz grits, and to lesser extent with coarse chalk particles. This is a rather rare type, with three whole vessels and six rim fragments. Four items are illustrated.

Distribution
The Main Iron I Horizon: 12698/1, 12731/1.
The Main Iron I Horizon, later phase: 10244/2, 10540/1.

Parallels
Jordan Rift Valley: **Dan,** Stratum V: Ilan 1999: Pl. 28:7. **Hazor**, Strata X-IX. Stratum Xb-a: Ben-Ami 2012: Figs.2.1:10–12; 2.4:6; 2.6:6; 2.8:12. Stratum IX: ibid. Fig.2.15:15; 2.16:7; 2.17:7; Yadin 1960: Pl. 52:2, 4. **Abel Beth Maacah,** Iron Age I–IIA: Panitz-Cohen & Mullins 2016: Fig.9. **ᶜEin Gev,** Stratum R-11: Sugimoto 1999: Fig.1-1:24. **Tall Zarᶜa**, Phase IV.5: Dijkstra/Dijkstra/Vriezen 2009: Fig. 4.3:6. Phase III.1: ibid: Fig. 4.3:7. **Tel Beth Shean,** Level VI (S-3a/2): Type CH70, Panitz-Cohen 2009: 209, Pl.66:6 (with an applied duck). Lower level V: James 1966: Fig. 47:3. Level IV: James 1966: Fig. 34:12. **Tel ᶜAmal,** Stratum III: Levy/Edelstein 1972: Fig.16:5 (stepped foot). **Umm ad-Dananir**, Burial Cave A4: McGovern 1986: Fig. 50:21.

Jezreel Valley: **Megiddo,** Stratum VIB: Loud 1948: Pl.74:17. Stratum VI: *ibid.* Pl.87:5–6, 9. Stratum VB: Finkelstein et al. 2000: Figs. 11.25:4, 7 (=Lamon/Shipton 1939: Figs. 33: 18, 20). **Yoqneᶜam,** Stratum XXa–XIXa: Ben-Ami 2005: Figs. III.8:7, 8; III.14:19; III.23:4, 5. Stratum XVII: Zarzecki-Peleg 2005: Fig.1.14: 10. Stratum XVI: *ibid.* Fig. 1.36:12. Stratum XIV: *ibid.* Figs. 1.40:12; 1.66:11. **Tell Qiri,** Stratum VIII/XI: Ben-Tor/ Portugali 1987: Fig. 29:3. Stratum VII: ibid: Fig. 10:11. **Taᶜanach,** Periods IIA–IB: Rast 1978: Figs. 24:10; 27:2; 14:15, 16; 17:16. **Tell el Far'ah,** Niveau VIIb: red slipped and burnished: Chambon 1984: Pl. 60: 10.

Phoenician Coast: **Tell Abu Hawam,** Stratum III: Hamilton 1935: Fig. 88. **Tell Keisan,** Level 9c (pi 6067): Puech 1980: Pl. 80:1a, b, c. Level 9c: ibid: 73:6. **Sarepta,** II-K-20: Anderson 1988: Pl.25:19. **Joya** cemetery: Chapman 1972: Fig.22: 220. 222.

Philistine Coast: **Tell Qasile,** Type CH2, Stratum XI: Mazar 1985: 48–49, Figs. 24:18; 26:9. Stratum X: ibid: 43:22. **ᶜIzbet Ṣarṭah,** Stratum I: Finkelstein 1986: 44, Figs. 21:19; 24:5.

Shephela: **Lachish** Sanctuary, Stratum V: Aharoni 1975: Pl. 42:14–15. **Timnah**, Type CH4: Stratum IVB: Mazar/Panitz-Cohen 2001: Pl. 85:7. Stratum IV: ibid: Pl. 82:15. Stratum IIII: ibid: Pl. 22:8; 14:13. Stratum II: ibid: Pl. 56:1–2.

CL02C Flaring Chalice with Petals

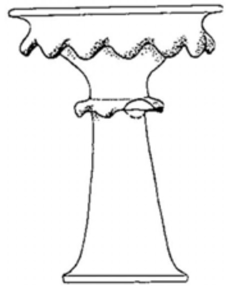


Fig. 5.37 Chalice 9595/1

The chalice 9595/1 (Fig. 5.37), from a domestic context in area R, Main Iron I Horizon, has applied petal formed decoration below the rim and at the point where the foot has been joined to the bowl. The chalice, its context, function, and parallels were discussed in detail by Gabriele Faßbeck (2008, where the scale included with the drawing is inadequate, but the one with the photograph is correct). She suggested that the chalice has been thrown in one piece. The chalice is 23 cm high, the bowl rim's diameter is 18 cm, and the diameter of the foot rim is 10.5 cm. The bowl is 6 cm high (5.5 cm deep). The most outstanding feature of the chalice is its plastic decoration of drooping petals on foot and bowl. Smaller petals circle the upper part of the slender foot, of which there were originally seven, while there were originally thirteen larger petals on the bowl. Faßbeck observed traces of thick pale slip on many parts of the vessel, and a decoration of black bands on the exterior surface. There were also blackened spots inside the bowl, most likely as a result of use with hot or burning materials. The elaborate appearance and the traces of use led her to suggest a function as an incense burner (Faßbeck 2008: 18–19).

The similarities between this chalice and metal incense burners called *thymiateria* (from the Greek *θυμιατήριον,* from *θυμιάειν,* to create smoke) were discussed by Faßbeck, who was inclined to think that the clay vessels imitate the more precious metal vessels (2008: 28–30). This logical suggestion suffers from chronological and regional discrepancies. The bronze incense burners are later, and mainly occur in the western Phoenician sphere, the Spanish and Portuguese coast (Niemeyer & Schubart 1965; Stern 1980: 98; Faßbeck 2008: 29; Panitz-Cohen 2010: 122). Despite the similarity of the petal decoration on the shallow bowl and the high foot, the bowls and petals are of rather different form. The earliest metal item from Israel-Palestine is from a Persian period tomb at Schechem (Stern 1980). Thus far, the oldest metal thymiaterion with petal decoration (on the foot) derives from a tomb on Cyprus, dated to the second half of the 11th century BCE (Franz 1998/1999: 82). Most of the clay items with reminiscent petal decoration are combinations of a stand and bowl (see below). Still, the parallels in clay from Israel-Palestine are closer to the item from Tel Kinrot, both in time and morphology, than the metal vessels, even though only the rim fragment from Abel Beth Maacah seems very similar (Mullins & Panitz-Cohen 2013).

<u>Parallels</u>
Jordan Rift Valley: **Abel Beth Maacah:** area A, Iron Age I–IIA (Panitz-Cohen 2013 et al.).

Reminiscent plastic decorations
Stands with attached bowl: **Tel ᶜAmal**, Level IV: Levy/Edelstein 1972: Fig.16:6 (red slipped); **Megiddo**, Stratum VIA: Finkelstein/Zimhoni/Kafri 2000: Fig.11.9:8 (=Loud 1948: Pl. 80:8); **Lachish**, Sanctuary, Level V: Aharoni 1955: Pl. 43:1. Chalice with protrusions and other decoration: **Hazor**, Stratum XII/XI: Yadin 1969: Pl. CCIV: 1.

Painted chalices with deep, carinated bowl and petals on foot: **Tell es-Safi/Gath**, Stratum A3: Shai/Maier 2012: 326; Pls. 14.4:4; 14.14:12; **Yavneh**, repository pit: Panitz-Cohen 2010: 122, Fig.7.2:28.

CL01–02: Chalice fragments of no closer definition

This group includes fragments with no closer definition. Mainly they are foot fragments, identified as chalices and not goblets because of the flaring or stepped foot form, the high foot, or of the flaring beginning of the bowl. The frequency of foot and base fragments (66) indicates that the chalices were more common than would be clear from the well-preserved items alone. Most of the fragments derive from the Main Iron I Horizon (35). Eight are from the Foundation Phase, and fourteen from the Post-destruction Phase. The fragments from later deposits (9) may originate from the Iron Age. The foot fragment 12299/3 has white slip and painted decoration reminiscent of chalices from Tell es-Safi (Shai & Maier 2012: 326).

Distribution
The Foundation Phase: 6477/4, 6484/1, 6483/2, 6480/3.
The Main Iron I Horizon: 6485/1, 6708/2, 8339/1, 12027/1
Post-destruction Phase (?): (Area N p-1, Locus 3569) 6560/1.
Natural fill below the surface: 10272/17, 12299/3.
Surface: 7562/1.

Pointed base

A small fragment of an unknown vessel 8046/6 resembles a pointed base. Comparable cone-bases appearing on bowls apparently planned to sit on a stand have been published from Tell Qasile (Mazar 1980: 96–100), and such cones sometimes appear on the bases of chalice bowls (see above). Therefore, I decided to include this fragment within the chalices, even though the assignment is speculative.

Parallel:
Yoqne'am, Stratum XVII: Zarzecki-Peleg 2005: Fig. I.24:6.

Goblets

Goblets are footed cups. Yon defines a goblet as a deep small bowl without handles, of proportions similar to a modern drinking glass (Yon 1981: 110, App. 5C). The vessel has a high and narrow appearance. The term has a somewhat different meaning for the Middle Bronze Age material, where it refers to cups or mugs with different kinds of bases (Amiran 1969: 95). During the Late Bronze Age and Iron Age the form appears with a flaring foot of varying height. In Israel-Palestine, and also at Tel Kinrot, the goblets have a trumpet foot. The foot is lower than the chalice feet, but higher than ring bases on other vessels. The 1.5–4 cm high foot builds up one fifth – one third of the height of the vessel. The vessel was probably thrown in one piece, and the foot cut in the second stage of forming the leather dry vessel on the wheel.

Altogether six whole vessels/profiles and four large fragments have been found at Tel Kinrot. In addition, there are four rim shards and two foot fragments that can be ascribed as goblets, though with uncertainty. The way of tempering the goblets seems to be less fixed than in the case of many other vessel types, such as chalices. Small basalt particles and large chalk particles are the most commonly observed particles, but quartz and mixed minerals (sand) occur as well. This might be coincidence, as the amount of goblets is small.

I have divided the goblets from Tel Kinrot into three types, of which only the rounded type G01 includes several vessels. Only one goblet has a high neck (10407/1) or a biconical[11] body (6484/2). The diameter of the opening is 4–7.5 cm and the cup 10–12 cm deep, more than half of the total height. Almost all vessels and fragments from Tel Kinrot are plain, and none has slip or burnish. This is peculiar, as goblets from other sites commonly bear red slip and decoration. Groups of slipped and decorated goblets with both rounded and biconical types have been found from the Late Bronze Age temples and shrines at Hazor, Tel Beth Shean, Tell Deir ᶜAlla, and Lachish. At Hazor, most goblets are rounded and carelessly painted in monochrome geometric patterns, many have burnished red slip, and few are plain (Yadin 1960: 76–77, 107; Epstein & Dothan 1989: 240–247; Dothan & Geva[12] 1989: 252, 269). At Tel Beth Shean, several goblets, often with red slip and painted decoration, derive from level VII Early (Fitzgerald 1930: 7, Pl. XLII; James & McGovern 1993: 75; Figs.10, 14, 18; Mazar 2006: 123), and a few mainly fragmentary items from level VI (Fitzgerald 1930: 9, Pl. XLIV; Panitz-Cohen 2009: 211). At Tell Deir ᶜAlla, biconical and rounded goblets mostly occur together, and many are painted, although plain goblets occur as well (Franken 1992: e.g. Figs. 4-14; 4-15). At Lachish, the mostly decorated goblets derive from Temples II and III (Amiran 1969: Pl. 40:9 – 11). At Megiddo, goblets appear slightly later but in the LB tradition with red wash, sometimes burnished, and often with painted decoration (Arie 2006: 200).

In Israel-Palestine, goblets have a narrow distribution in time and space, and probably also a restricted function. It has been suggested that they would have served a ceremonial purpose (Killebrew 2005: 119), but at Tel Kinrot this idea does not find support, as the plain goblets derive from domestic contexts. In general, the different types have divergent chronological

[11] This type is sometimes called carinated (James & McGovern 1993: 75), but as the word is also used for another type of Middle- and Late Bronze Age goblet (Mullins 2007: 416), I refrain from its use here.
[12] The writers of the stratigraphy and pottery description appear in the introduction of Hazor III–IV report, p. xviii.

distributions. The Biconical goblet (G03) is mainly found in contexts dated to the end of the Late Bronze Age, while the rounded goblet with short neck (G01) seems to be found mainly in contexts attributed to the transition of the Late Bronze age and the Early Iron Age. The variant with high and narrow neck (G02) appears only during Iron Age I. All these types appear at Tel Kinrot, but the assemblage is dominated by the rounded, short necked goblet.

G01 Rounded Goblets with a Short Neck

This type has a rounded, slightly oval body and a short, rather wide neck (Fig. 5.38, App. 5C). The whole vessel is 14.5–20.5 cm high and 9–11 cm wide at the maximum. The rim is simple and upright or flaring. The diameter of the opening is 5–7.5 wide, except for goblet 5204/1, which is narrower (3.5 cm). The base of the cup is rather thick (2–4 cm). Two goblets (6972/1, 14044/1) have a ribbed surface on the upper part of the body. The rim fragment (11568/2) has painted (bichrome) decoration. At Tel Kinrot the rounded goblets were found both in the Foundation Phase (4 items) and in the Main Iron I Horizon (5 items). The relative frequency of the goblets in the Foundation Phase is noteworthy, as there is less material overall in this phase.

Fig. 5.38 Goblet 14044/1

Distribution
Foundation Phase: 5204/1, 8727/1, 6972/1, 6484/3
The Main Iron I Horizon: 7849/2, 8189/1, 9625/1, 14044/1.

Parallels
Jordan Rift Valley: **Dan,** Stratum IVB: Ilan 1999: Pl.17:11 (perforated upper part indicating a special function). **Hazor,** Strata 1B–1A: Yadin 1960: 107, Fig. CXVIII: 28–29; Dothan/Geva 1989: 252, 269; Yadin 1969: Pls. CCLXXIII: 7–10; CCLXXX: 6–7. **Tel Yin'am,** Stratum XIIB: Liebowitz 2003: 118–119, Fig. 6:6 (with a wide, slightly biconical body). **Tel Beth-Shean,** Level VII: Fitzgerald 1930: Pl. CXLII: 22; James/McGovern 1993: Figs. 10:10–11; 47:7; 51:8. Level VII Early (Q-2/3): Mazar 2006: 123, Pl. 3:4. Level VI (S-3): Panitz-Cohen 2009: 211; Pl.52:13. **Tell Deir ᶜAlla Temple,** Phases E1, E4–E6: Franken 1992: Figs. 4-3:15; 4-14:12, 14–15; 4-15:22; 4-20: 3–4, 7–8; 4-24:6–7.

Jezreel Valley: **Megiddo,** Stratum VIB: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.7:10–11 (=Loud 1948: 74:18–19). Stratum VIA: Loud 1948: Pls.72: 14–15 (Temple 2048[13]); 79:11; Finkelstein/Zimhoni/Kafri 2000: Fig. 11.2:4; Arie 2006: 200, Fig. 13.53:4. Stratum VI: 87: 1–3, 24 (ambiguity in stratigraphy). **Yoqneᶜam,** Stratum XVIIIa: Zarzecki-Peleg 2005: Fig. I.32:10. **Taᶜanach,** Period IA: Rast 1978: 14, Fig.8:14 (painted stripes). Period IB: ibid: Fig. 14:14 (plain, like 8189/1).

Phoenician Coast: **Tell Keisan,** Level 9c (Pit 6067): Puech 1980: 224, Pl.73: 2, 2a, 4, 4a (two with painted stripes and two plain).

[13] Temple 2048 was originally stratified as VIIA (Loud 1948) but re-evaluated by Mazar 1985b: 97, followed by Kempinski (1989: 77–83), Ussishkin (1995: 256) and by Arie (2006) based on a ceramic study.

G02 Rounded Goblets with Tall, Narrow Neck

Fig. 5.39 Goblet 10407/1

One vessel from the Main Iron I Horizon (10407/1, Fig. 5.39) has a tall and narrow, upright neck and an oval body. The neck is ca. 6 cm high. The rim is thickened and slightly everted. The vessel is 25 cm high and the maximum width is 15 cm. The opening at the rim is 4 cm wide (interior diameter, exterior rim diameter is 6 cm). The trumpet base is 2.5 cm high and 11 cm wide. The base of the vessel is thin (ca. 0.5 cm). No surface treatment could be observed, though this form of goblet at other sites often bears painted decoration. This is especially the case at Tel Qasile, with several goblets from contexts interpreted as a temple and shrine (Mazar 1985: 49–51).

<u>Parallels</u>
Jezreel valley: **Megiddo**, VIA: Arie 2006: 200, Figs. 13.63:10; 13.66: 8 (with a biconical body and a high neck falling between the rounded narrow necked G02 and biconical G03 types).

Philistine Coast: **Qasile,** Stratum XII: Mazar 1985: 49–51, Fig. 11:22. Stratum XI: ibid: Figs. 19:43, 30:2. Stratum XI–X (Shrine 300): ibid: Fig. 32: 7–11. Stratum X: ibid: Figs. 34: 16–17, 40: 12–14.

G03: Biconical Goblet

The biconical goblet is of the same size as the rounded, short necked goblet (G01). The only example of this kind was found from the Foundation Phase (6484/2, App. 5B). It is 15 cm high and 10.5 cm wide at its maximum width, at the lower third of the cup. The diameter of the wide opening is 8.5 cm (from the exterior). There is a pronounced angle on the wall at the mid of the height of the vessel (which is also the point of the maximum width). The lower part is rounded and the upper part is concave. The cut rim is thickened inside.

<u>Parallels:</u>
Jordan Rift Valley: **Hazor,** Stratum 1B: Yadin 1960: Pl. 118:27; Yadin 1969: Pl. 273: 9. **Tell Deir ʻAlla,** Phase E: Franken 1992: Fig.3-7; 4-14:13; 4-24:5.
Phoenician Coast: **Tell Abu Hawam,** Stratum IV: Hamilton 1935: 30, 170 (a wide goblet).

G01–03 Goblet fragments not further defined

This group was created for rim parts and foot fragments that could not be further defined to a certain type, as there seems not to be a clear connection between the foot and bowl forms. There are two base fragments and four rim fragments that best fit the group of goblets; two of them are illustrated. Two derive from the Foundation Phase and two from the Main Iron I Horizon. In addition, two fragments are from mixed deposits close to the surface, but they most likely originate from the Early Iron Age phases.

<u>Distribution</u>
Foundation Phase (or Main Iron I, earlier phase, L6473): 11568/2
The Main Iron I Horizon: 7513/1

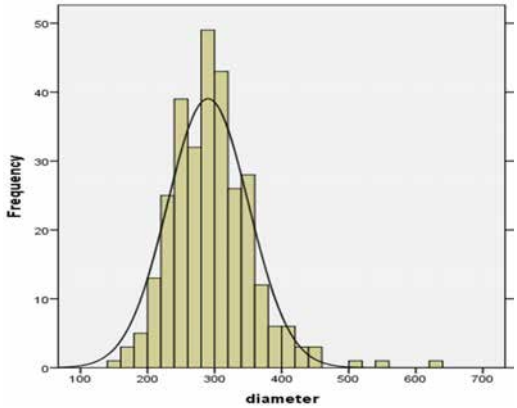
5.2.2 Kraters

The Greek term *κρατήρ* originally denoted a vessel for mixing water and wine in the symposia (Liddel & Scott 1968; Clark et al. 2002: 104). The vessel had to be deep enough for mixing liquids. At the same time, the opening had to be wide enough to enable easy pouring of liquids into it, and to extract the mixed drink from the vessel with juglets or cups (Yon 1981: 63; Homès-Fredericq & Franken 1986: 23; Hunt 1987: 193; Dayagi-Mendels 1999: 55, 59, 88). The traditional interpretation of kraters as serving vessels is supported by krater-like vessels appearing in feasting contexts on Megiddo ivories (Yasur-Landau 2005: 172–177). Kraters from Timnah were considered to be serving vessels, even though the assemblage included large, heavy examples close to jars in their form (Mazar & Panitz-Cohen 2001: 14, 30; Fig. 30). Based on observed use wear and local distribution at Megiddo, Arie suggested that the kraters would have served a function related to daily household activities (Arie 2006: 196–197). Panitz-Cohen divided kraters at Tel Beth Shean into two functionally distinct groups: the mid-sized vessels for tableware, food-processing, and short-term storage, and the large, pithos-kraters for storage (2009: 211). Kraters often bear a resemblance to cooking vessels. This is especially clear for the Carinated type KR04 (below), but the affinity also appears in the everted kraters of the Bronze Age (Finkelstein & Bunimowitz 1993: 131; Ben-Dov 2011: 227; Mullins 2007: 417–418), and in the Iron Age II kraters (Ben-Ami & Ben-Tor 2012: 419). A lack of decoration and morphological similarity to cooking pots may point to an everyday use related to processing, serving, and storage of foodstuffs.

In Israel-Palestine, necked kraters are rather common during the Late Bronze Age (e.g. Amiran 1969: Pl. 41; Mullins 2007: 420–421). In the Iron Age, the neck part is short and wide or wholly absent. The krater is a form between closed and open vessels. The height and width are nearly the same – the width usually slightly bigger. However, the height is often an estimate only, due to the fragmentary nature of the material. The difference between bowls and kraters is fluid (Hunt 1987: 193; Mazar & Panitz-Cohen 2001: 30; Maier 2007:255–256). Kraters are larger and deeper than bowls, but there are no fixed points of division used for all sites. For the Middle Bronze Age pottery from Tel Beth Shean, Maier set a flexible dividing point at 25–30 cm wide diameter. A closed form and diameter above 15 cm were used as criteria for the vessels from Timnah (Mazar & Panitz-Cohen 2001: 30). The fluctuations between kraters and bowls on one hand, and between kraters and jars or pithoi on the other, reflect the heterogeneous nature of the various forms defined as kraters.

Because of the lack of agreed, clear definitions, I decided to rely on a set of criteria that could be observed on rim parts for the classification of material from Tel Kinrot. I included five features commonly associated with kraters: 1) inverted upper part; 2) large size in comparison with bowls, i.e. the diameter of the opening is over 22 cm; 3) handles; 4) thick walls (at least 6 mm); 5) thickened rims (over 1 cm thick). At least three of these features should be present in all items classified as kraters. The diameters and maximum rim thicknesses of vessels identified as kraters appear in Figs. 5.40 A and B. Most of the kraters have a slightly closed form: the upper part is inverted. However, the openings are wider than those of the storage jars and pithoi. The diameter of the rim is approximately the same as that of the shoulder, or slightly less. The rim is usually thickened, often prominent, while it may be inverted or everted. The ware is middle tempered or coarse, and the walls are thick. Kraters often have handles attached to the upper part of the vessel – a feature common with jars (especially the type SJ08). As most fragments are too small to indicate the existence of handles, I did not consider their presence crucial for the definition of kraters (unlike Fritz 1990: 27). For the same reason, I did not use handles for type definitions (Arie 2013a: 490).

Kraters are rather common at Tel Kinrot. They derive from domestic contexts together with bowls, cooking pots, and storage jars. There are altogether 350 items defined as kraters from the Iron Age levels and later mixed loci (Fig. 5.41). In the intensively retrieved areas U & W, kraters make up 13 % of the assemblage (298 items). The most common type of Carinated krater (KR04) is very distinctive, along with the Shallow Bowl-Krater with handles (KR06A). However, these types, along with the smaller sub-type of inverted kraters (KR03B) and Bell-shaped kraters (KR05), are morphologically close to bowls. If they were counted as bowls, the overall frequency of kraters would drop to 112 items altogether and 56 items (2.6 %) in the intensively retrieved areas. The heavy and deep types (KR01 and KR03A) include only a few well-preserved vessels, complicating their definition. As a result of the heterogeneous and fragmentary material, some of the types are broad and their borders are fuzzy. In spite of this, I preferred to create several types and classify the fragmentary material into them, because this enabled me to group most of the material and to see if their distributions at Tel Kinrot would differ. The illustrations appear in Appendix 5D.



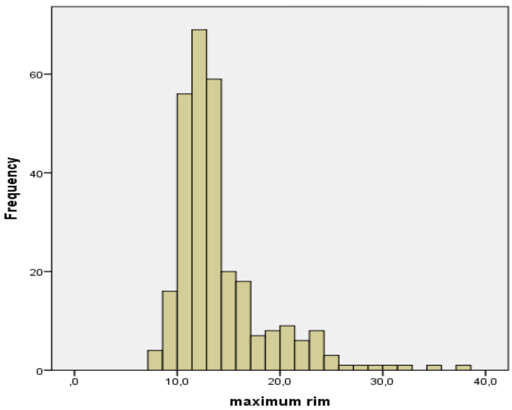


Fig. 5.40A (on the left): Distribution of the diameter width of the kraters with a normal curve. Mean is 29.0 cm, standard deviation is 60.7 and n=297. Fig. 5.40B (on the right): Distribution of the maximum thickness of the rim of kraters. Mean is 14.1 mm, st. dev. is 4.5; n=290. Both distributions are skew towards the high values.

Krater types in the areas U & W		Phase 0	1	2	U3A/W3	U3B/W4	U4	U5	Total
Undefined	KR00	1	0	1	4	0	0	0	6
Krater with everted rim	KR01	5	3	4	7	7	0	0	26
Inverted, thick rimmed krater	KR03A	8	0	5	9	2	0	0	24
Inverted, small krater	KR03B	10	1	6	10	7	0	0	34
Carinated krater	KR04	61	19	25	39	49	2	0	195
Bell-shaped krater	KR05	2	1	1	4	2	0	1	11
Shallow bowl-krater	KR06A	1	0	0	0	1	0	0	2
Total		88	24	42	73	68	2	1	298

Fig. 5.41 Distribution of the krater types at Tel Kinrot according to the local phases (intensive areas U and W).

KR01: Kraters with Everted Rim Part

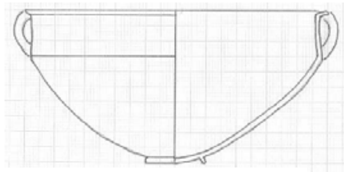


Fig. 5.42 prototype KR01

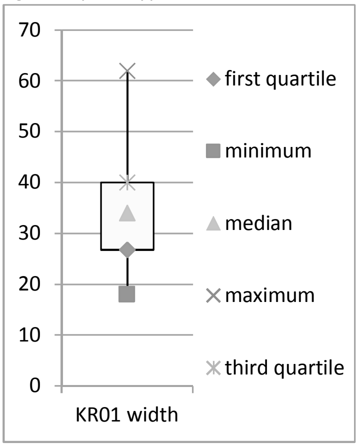


Fig. 5.43. Box-plot of the diameter of the rim. Based on material from both projects, n=36.

These kraters are wide and have a prominent, everted rim (Fig. 5.42). The upper part is upright or slightly inverted and the diameter of the rim is 20–50 cm, while most openings are 28–40 cm wide (Fig. 5.43). The great variability of the rim diameter probably reflects the unstandardized nature of this vessel type and the wide chronological distribution. Walls are 7–14 mm thick, and the rim is commonly thickened. Sometimes two loop handles are attached from rim to shoulder. Only one vessel is fully preserved (4446/1). It is 50 cm wide, 25 cm high, and has a ring base. Mostly rim fragments have been found. A few fragments (4340/1, 7088/1, 7116/6) have brown, painted geometric decoration. Krater 4340/1 has a clear neck and handles on the shoulder. This vessel has a close parallel at LB I Hazor (Covello-Paran 2007: 23, Fig. 8:4). Krater 7578/1 has especially thick walls (13–20 mm) and rim (34 mm). It has raised ridges at the neck and shoulder. This type of krater represents continuity from the Late Bronze Age to the Early Iron Age at Tel Kinrot. Items considered KR01 were found from the LB stratum VIII through the Main Iron I Horizon. Some of the fragments from Iron Age layers might also be residual. The clay is usually strongly tempered with small–medium sized mineral particles (mainly basalt and chalk).

Distribution:
Stratum VIII: 4446/1.
Stratum VII: 4333/1, 4340/1.
Foundation Phase (fill of): 6070/4, 6181/1, 7116/6.
Main Iron I Horizon: 7088/1, 7578/1.
Main Iron I Horizon, Earlier Phase: 10583/1, 10733/4, 12087/14.
*Fill under Ottoman structure (*Locus 9920): 11104/7.
Natural fill below the Surface: 10272/11.

Parallels:

Tel Kinrot, Stratum V: Fritz 1990: Pl. 94:2. Fill of Stratum II: ibid: Pl. 60:3.

Jordan Rift Valley: **Dan,** Stratum X: Biran 1994: Fig. 68:11. Stratum IX: Ben-Dov 2011: Fig. 25:6. Stratum VIIIB: ibid: Fig. 26:9. Stratum VII: ibid: Fig. 42:4–5; 94:6. Krater type KR1: Ben-Dov 2011: 226, Fig. 173:1–2. Stratum VI: Ilan 1999: Pl. 47:2. Stratum V: ibid: Pl. 32:9. **Hazor**, Stratum 3: Yadin 1958: Pl. CXXIII: 12–13; Yadin 1960: Pl. CX: 1–2. Stratum XV: Garfinkel 1997: Fig. III.12:27–28. Locus 7021 (LBI) Yadin 1958: Pl. CXXXVII: 3, 5; Yadin 1969: CCXLII: 2 (LBI Burial). Stratum 2: Yadin 1969: Pls. CCLXIV: 13–14; CCLXXXIX: 1. Stratum XV: Garfinkel 1997: Fig. III.16:5; (Area A, Stratum 8) Bonfil 1997: Figs. II.18:11–12; II.22: 19–21. Stratum 1A–B: Yadin 1958: Pl. LXXXIX: 2; CXXV: 9. Stratum 1A: Yadin 1960: Pl. CXXIV: 12, 14. Area A, Stratum 6: Bonfil 1997: Fig. II.34:15. **Tel Yin'am,** Stratum XIII: Liebowitz 2003: Fig. 2:5–6. Stratum XIIB: ibid: Fig. 48:2. Stratum XII: ibid: Figs. 24: 5; 26: 6–7, 10 (krater types 2 and 6). Stratum XIA: Liebowitz 1979: Fig. 7:7. **Tel Beth Shean**, Level XI–X (R5–4): Maier 2007: Pls. 4:2–5; 23:15. Level XA (R3): ibid: Pls. 13:12–13; 18:16; 29:1, 4; 31:2; 34:10, 15–16. Pre-Level IX (R2): Mullins 2007: Pls. 39:8; 42:8; 44: 5–6; 51:6. Level

IXB: ibid: Pls. 67:11; 70:13. Level IXA: ibid: Pl. 76:7–8. The LB-parallels are of type KR1 Everted-rim carinated kraters (Mullins 2007: 418–420). Level VIII: James/ McGovern 1993: Fig. 17:5. Level VII: ibid: Figs. 21:3; 33:6–7; 47:4. Late Level VII (N-4): Panitz-Cohen 2009: Pl.2:1. Level VI: James 1966: Fig. 52:20; 57:7; (N-3b) Panitz-Cohen 2009: Pl. 12:16; (S-4) Pl. 26: 2; 29:9; (S-3) Pl. 40:4; 52:15; 63:14. Late Level VI-Lower V (S-2): ibid: Pl.73:15. The IA parallels are mainly of type 70 and partially of type 72a by Panitz-Cohen (2009: 214–215, 220–222). Lower Level V (or late Level VI): James 1966: Fig. 5:9; 29:11. Stratum VII (D-4): Mazar/ Bruins/Panitz-Cohen/Plicht 2005: Figs. 13.7:8. Stratum VI: ibid: Fig.13.18:8. **Pella**, Phase II: Smith/Potts 1992: Pl.49:13. Stratum 8 in area VIII: ibid: Pl. 64:1. **Tell Deir ᶜAlla,** the Late Bronze Age Sanctuary, Phase D: Franken 1992: Fig. 7-10:44. Phase E10: ibid: Fig. 5-13:13–14. Phase F: ibid: Fig. 7-21:46. **Um-ad-Dananir**, burial Cave 3B: McGovern 1986: Figs. 34:6, 8; 35:7. Cave A4: ibid: Fig. 50:22; 51:24. **Tall al- ᶜUmayri,** Integrated Phase 12: Herr 2002: Fig.4.15:5–6.

Jezreel Valley: **Megiddo,** Stratum VIII–VIIB (F-9): Ilan/Hallote/Cline 2000: Fig. 9.11:5. Stratum VIB: Loud 1948: Pl. 74:12 (=Finkelstein/Zimhoni/Kafri 2000: Fig.11.6:10). Stratum VIA: Loud 1948: Pl. 79:1 (=Finkelstein/ Zimhoni/Kafri 2000: Fig.11.10:9). **Yoqneᶜam**, Stratum XXa: Ben-Ami 2005: Fig.III.6:18; III.8:11; III.12:19. **Tel Qiri**, Stratum XIII/IX: Ben-Tor/Portugali 1987: Fig.29:5. **Ta'anach,** Period IB, Rast 1978: Fig.16:6–7.

Central Hill Country: **Shiloh,** Stratum VIII: Bunimowitz/Finkelstein 1993: Fig.6.6:1–2. Stratum VI: ibid: Fig. 6.34: 2, 7–10. Stratum V: ibid: Fig.6.57:5; 6.59:2.

Phoenician Coast: **Tell Keisan,** Level 9a–b: Briend 1980: Pl.64:3. **Tell Abu-Hawam**, Stratum V: Hamilton 1935: Fig.232. **Tel Dor**, Irb horizon: Gilboa/Sharon 2003: Fig.7:15–18. Parallels are of type KR1 (Gilboa/Sharon 2003: 26). **Tyre,** Stratum XIi: Bikai 1978: Pl.XXXII:13. **Sarepta,** Stratum G: Anderson 1988: Pls. 26:8–9; 28:1–3. Stratum E: Pl.31:1.

Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: Fig.17:1.Stratum XI: ibid: Fig.24:16. **Tell es-Safi,** Phase E4b: Gadot/Yasur-Landau/Uziel 2012: Pl.12.7:7.

Other: **Kamid el-Loz**, Layer 3b: Hachmann/Miron 1980:84, Taf.23:4. Tomb 16: Poppa 1978: 89, Taf.12.16:5.

KR02: Necked Kraters with Upright Rim Part

There are a few wide vessels with a short neck and a clear shoulder. Three vessels have 26–29 cm wide openings, while one rim part (14367/1) is only 16 cm wide and another (8868/1) is 38 cm wide. The rim is thickened and rounded (Fig. 5.44). Fragment 11105/8 has traces of red slip and a ridged rim. These few vessels do not have handles, but their fragmentary nature hampers firm conclusions. Their thick, rounded rims and upright necks appeared to me similar enough to allow a separate group for these fragments. However, the group remains tentative.

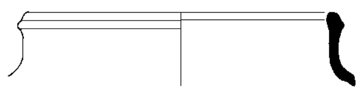


Fig. 5.44 Necked Krater 8216/4

Distribution:
Main Iron I Horizon: 8216/4, 8868/1, 11105/8, 14367/1.
Surface: 11023/1.

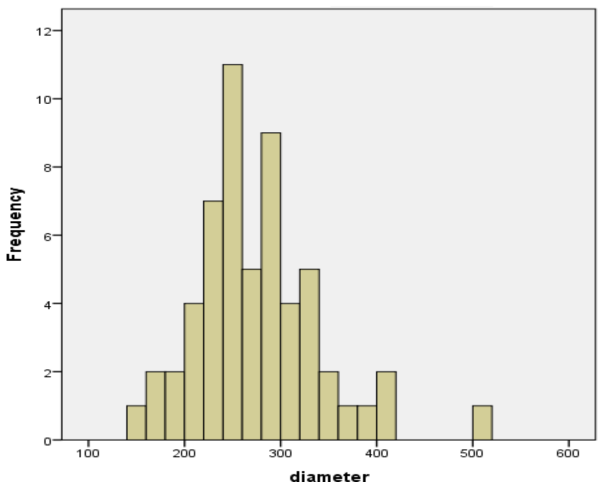
Parallels:
Jordan Rift Valley: **Hazor**, Stratum XII/XI: Yadin 1969: Pl. CCIII: 12. **Tel Yin'am,** Stratum XII: Liebowitz 2003: Fig. 25:7. Stratum XIIA: ibid: 32:6 (cooking pot of similar shape). **Tel Beth Shean**, Level VI (N-3b): Panitz-Cohen 2009: Pl.16:1. Late Level VI-Lower V (S-2): ibid: Pl.71:8.

Jezreel Valley: **Yoqneᶜam**, Stratum XVII: Zarzecki-Peleg 2005: Fig.I.14:24–25. Stratum XV: ibid: Fig. I.49:14. Stratum XII (cooking pot): ibid: Fig. I.84:22. **Ta'anach,** Period IB, Rast 1978: Fig. 12:6.

Philistine Coast: **Tell es-Safi,** Phase E3: Zukerman 2012: Pl. 13.2:15. Phase A3–A2: Shai/Maier 2012: 324, 14.18:7.

KR03: Inverted Kraters

There are 57 inverted kraters (with measured diameter) from the intensively retrieved areas U & W. I have divided inverted, thick rimmed kraters into two sub-types, with the main criterion of the size. When the diameter of the rim of these two subtypes is regarded together (Fig. 5.45A), it appears that the distribution has two peaks, one at 24–26 cm (KR03B) and another at 28–30 cm (KR03A). I set the arbitrary division at 27 cm for the rim diameter. However, the drop at width of 26–28 cm is not great, and may be incidental. The distribution of the maximum rim thickness has only one peak. However, there are other features that constantly occur with the size: the larger vessels tend to have thicker walls and some of them have handles, while the smaller vessels never have handles but more often have surface treatment.



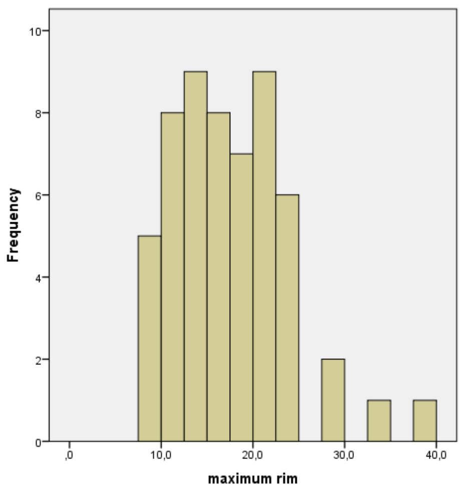


Fig. 5.45 Distribution of the A (on the left) width of the opening of and 5.45B (on the right) maximum rim thickness of inverted kraters (KR03A and B) combined. Figures are based on the material from the intensive retrieval. Mean of rim diameter is 26.9 cm, standard deviation is 64.8 and n=57; Mean of the maximum rim thickness is 17.6 and standard deviation 6.1, n=56.

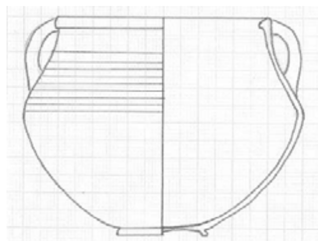


Fig. 5.46A prototype KR03A

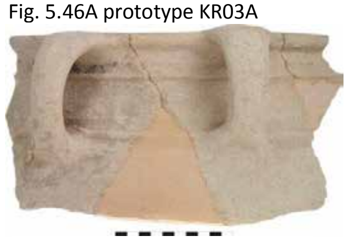


Fig. 5.46B krater 14360/1

KR03A: Wide Inverted Kraters with Thick Rims

These vessels have an inverted upper part and thick rims that vary in detail. The vessels that have a preserved lower part have a carination on the wall approximately at the middle or above the middle of the (estimated) height of the vessel (Figs. 5.46A and B). The rim is thickened and prominent, with some vessels having a ridge below the rim (8321/1, 10239/22, 8074/1). The width of the opening varies between 27 and 45 cm (mean at 34; the distribution is skewed towards the larger values and the most common value is 28 cm). The upper part tends to have a gutter below the rim. These kraters often have handles from rim to shoulder. Kraters 5111/1 and 14360/1 (Fig. 5.47) have multiple handles, but most of the fragments of this type lack the handle or have only one preserved. This is at least partially due to the state of preservation. This type has a broad definition and broad chronological distribution. It is difficult to pinpoint common chronological trends. Some vessels have ridges on the shoulder (5111/1, 8321/1, 14360/1) or on the rim (10239/22). Two rim fragments have red slip or traces thereof (11066/2, 11073/7, both unstratified), while the vast majority have no traces of slip or burnish. These two fragments also include traces of organic temper, while most of the kraters have mineral tempering with mainly grits of basalt and chalk.

The variety included in this type makes the citing of parallels difficult. The following list includes comparisons that are close to some of the vessels I have grouped together under the Thick rimmed, inverted kraters. For example, krater 9733/8 with a ledge rim and grooved wavy line below it has a parallel from Hazor, dated to Late Bronze Age I (Area A, Str. 9B, Bonfil 1997: Fig. II.12:18), which it is not very similar to most other kraters within this type at Tel Kinrot.

Distribution:
Foundation Phase (fill of, Locus 6276): 9733/6
Main Iron I Horizon, earlier phase (L1835): 14360/1.
Main Iron I Horizon: 5111/1, 8321/1, 10239/22, 10239/24, 10243/7, 12087/9, 12113/2, 12139/3, 11578/1 (not illustrated).
Post-destruction Phase: 8074/1, 5034/2.
Later deposits: 4035/5 (E1), 12036/1.
Natural fill below the Surface: 10272/2, 11066/2, 11073/7.

Parallels:

Tel Kinrot, Stratum IV: Fritz 1990: Pls. 84:10; 95:8–10. Fill of Stratum II: ibid: Pl.60: 4–5. Stratum IIB: ibid: Pl.61:4. Stratum IIA: ibid: 62:2. Stratum II: ibid: Pls. 86:16; 88:5; 90: 7–10. Stratum IC: ibid: Pls. 67:16–18; 68:1–3. Stratum IB: ibid: Pl. 71:3–4, 7–9. Stratum IA: Pls. 77:13–16; 81:11–12.

Jordan Rift Valley: **Dan,** Stratum VIIIA: Ben-Dov 2011: Fig. 32:4. Stratum IVB: Ilan 1999: Pl. 10:7. **Hazor,** Stratum 2: Yadin 1960: Pl. CXVI: 15–16, 18. Stratum 1B: Yadin 1958: Pl. XC: 8; Yadin 1960: Pl. CXIX: 5; Yadin 1969: Pl. CCLXXIV: 3; Bonfil 1997: Fig. II.12:18. Stratum 1: Yadin 1958: Pl. XCVII: 4; Yadin 1960: Pl. CXLI: 22; Yadin 1969: Pl. CCLXXX: 9. Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Figs.1.1:9; 1.8:14; 1.11:2; Yadin 1969: CLXIV: 23–24. Area A, Stratum 6: Bonfil 1997: Fig. II.33: 6, 15–16. Stratum Xb: Ben-Ami 2012: Figs.2.1:13; 2.3:18. Stratum Xa: Ben-Ami 2012: Fig.2.10:12. Stratum X: Yadin 1969: Pl. CCVII: 6–7; Garfinkel 1997: Fig. III.22:6. Stratum IXB: Yadin 1969: Pl. CLXXV: 21–22. Stratum IXA: Yadin 1969: Pl. CLXXIX: 2. Stratum VIIIa: Ben-Ami 2012: Figs. 3.5:1–2; 3.7:16–18. Stratum VIII: Yadin 1958: Pl. XLVII: 27–28; Yadin 1960: Pl. LVI: 3–5, 12–14; Garfinkel 1997: Fig. III.26:3. Stratum VIII–VII (Area A, Phases 5 – 4): Bonfil 1997: Figs. II.38:5–6. Stratum VIII–V: Ben-Ami/Sandhaus/Ben-Tor 2012: 446–448. Stratum VII: Garfinkel 1997: Figs. III.21; 31:2. **Tel Hadar,** Stratum IV (M. Kochavi/E. Yadin pers. comm). **Tel Yin'am,** Stratum XIIB: Liebowitz 2003: Fig. 21:9. Stratum XII: ibid: Fig. 17:6; 22:8; 23:6–7. Stratum XIIA: Figs. 35:8; 42:8 Stratum XIA: Liebowitz 1979: Fig. 7:6. **Tel Zar**^{c}**a**, Phase IV.5: Dijkstra et al. 2009: Fig. 4.3:9. Phase IV.3: ibid: Fig. 4.4:15. Phase III.1: ibid: Fig.4.5:13. Phase II.2: ibid: Fig. 4.3:8. Phase II.1: ibid: Fig. 4.8:8. **Tel Beth Shean,** Level VIII: James/McGovern 1993: Fig. 16:14. Level VII: ibid: Figs. 9:6, 9; 20:5; 36:5–8. Level VI: James 1966: Fig. 53: 15; 57:17; (Stratum 4) Yadin/Geva 1986: Fig. 33:4; (S-5) Panitz-Cohen 2009: Pl. 21:5–6; (S-4) Pl. 26:4–5; 29:8; 37: 8–9; (S-3) Pl.38:3; 40:3; 43:9–10; 56:23–24; 62:1; 65:3, 10. Late Level VI–Part of Lower V (Stratum 3): Yadin/Geva 1986: Fig. 11:2–4; (S-2): Panitz-Cohen 2009: Pl. 72:3. Lower Level V: James 1966: Fig.25:1, 5. Upper Level V: James 1966: 146, Fig.6:7. Level IV: James 1966: Fig.32:6; 38:9. The IA-parallels are mainly of type KR72a by Panitz-Cohen (2009: 220–222). **Pella**, Phase II: Smith/Potts 1992: Pl.49:12.Stratum 7 in area VIII:

ibid: Pl. 65:4, 7. East Cut IVE: ibid: Pl. 68:10–11. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 287: 1, 5.Phase XI: ibid, Fig. 104: 8; 105: 4–6; 106: 2–3. XIII: ibid: Fig. 69:7. **Tell Deir ᶜAlla,** the Late Bronze Age Sanctuary, Phase D: Franken 1992: Fig. 7-10:50. Phase XII: ibid: Fig. 150: 3 – 4, 6. Phase E: ibid: Fig. 7-18:156, 158–164. Phase E7: ibid: Fig. 5-3:8. Phase E9: ibid: Fig. 5-10:13. Phase F: ibid: 7-21:37, 39–40. **Tell Deir ᶜAlla,** the Iron Age habitation, Phase A: Franken 1969: Fig.46:11. Phase C: ibid: Fig. 55:1–4. Phase D: ibid: Fig. 57:43–44. Phase E: ibid: Fig. 59:111–114. Phase F: ibid: Fig.62:22–25. Phase G: ibid: Fig. 65:47, 49–51.Phase H: ibid: Fig. 67:75–76. Phase J: ibid: Fig.70:45, 47–48. Phase K: ibid: Fig. 73:1, 4–6. Phase L: ibid: Fig. 75:92. **Um-ad-Dananir**, burial Cave 2A: McGovern 198: Fig. 22:28. Burial Cave 3B: ibid: Fig.35:8. Khirbet: ibid: Fig. 47:13. Cave A4: ibid: Fig. 51:27. **Tell es-Saᶜidiyeh**, Stratum VII: Pritchard 1985: Fig. 1:1, 4. Stratum VI: ibid: Fig.9:15.**Tall al- ᶜUmayri**, Integrated Phase 13: Herr 2002: Fig.4.11:23–24. Phase 12: ibid: Fig.4.15:7–8. Phase 11: Herr 2000: Fig. 4.14:16. Phase 10: ibid: Fig.3.12:22, 24. Phase 9: ibid: Fig. 3.23:8 (Stratigraphic key, Herr 2002:11).

Jezreel Valley: **Megiddo,** Stratum VIIA: Finkelstein/Zimhoni 2000: Fig.10.2:19; Arie 2013a: Fig. 12.66:3 (of krater type 2). Stratum VIB: ibid: Fig. 12.73:6.Stratum VIA: Loud 1948: Pl. 78:17 (=Finkelstein/Zimhoni/Kafri 2000: Fig.11.10:7); Arie 2013a: Fig. 12.74:3. Stratum VB: Finkelstein/Zimhoni/Kafri 2000: Fig.11.20:13. **Yoqneᶜam**, Stratum XVII: Zarzecki-Peleg 2005: Fig. I.120: 7–8. Stratum XIV: ibid: Fig.I.45:33; I.50:8–9; I.63:4; I.66:15. Stratum XIII: ibid: Fig. I.70:4, 10; I.75:24. Stratum XII: ibid: Fig. I.77:24; I.90:7. **Tel Qiri**, Stratum XIII: Ben-Tor/Portugali 1987: Fig.28:3. Stratum V: ibid: Fig.22:10. **Ta'anach,** Period IA: Rast 1978: Fig. 4:8–9. Period IB, ibid: Fig. 12: 4–5; 16:3–4. Period IIA: ibid: 19:7, 22:7–8; 25:6.

Central Hill Country: **Tell el Far'ah**, Stratum VIId: Chambon 1984: Pl. 47:7. **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Fig.6.52:6; 6.57:2–3.

Phoenician Coast: **Tell Keisan,** Level 11: Puech 1980: Pl.81:10, 14, 17. Level 9c: ibid: Pl. 80:6. **Tel Dor**, Irb horizon (Area G, 7a): Gilboa/Sharon/Zorn 2004: Fig.7: 25–26.

Philistine Coast: **ᶜIzbet Sartah**, Stratum III: Finkelstein 1986: Fig.8:13. Stratum I: ibid: Fig.22:18.

Other: **Tell Afis**, Levels 10–8: Venturi 1998: Fig.6:3–5, 9; 10:1–4. Levels 9b–a: Venturi 2000: Fig.6:15–17; 8: 12–16; 9:8–9. **Hama,** Periods I–II, IV: Riis 1948: 57–58, Figs. 56 and 58. Parallels are of types A and C.

KR03B: Small Inverted Kraters with Thickened Rims

These kraters have a rounded body, an inverted upper part, and a pronounced rim (Fig. 5.47). The lip is thickened on the outside or on both sides. The walls are of medium thickness, mainly 7–10 mm. There are no handles preserved. The rim is 15–27 cm wide. They differ from subtype 3A in their smaller size and the absence of handles. The upper part is rounded or sloping. Kraters 8554/1 and 8474/1 have an upright upper part, forming a short and wide neck. The vessels are strongly tempered with mainly basalt and chalk particles. Some fragments (6715/1, 8872/1, 10034/1, 10238/5) have red slip, burnish, and/or painted bands.

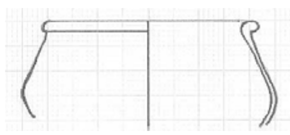


Fig. 5.47 prototype KR03B

Distribution:
Foundation Phase: 6712/1, 6715/1, 9503/1, 12116/4.
Main Iron I Horizon: 8474/1, 10034/1.
Main Iron I Horizon, earlier phase: 10243/7.
Main Iron I Horizon, later phase: 10238/5.
Post-destruction Phase: 8554/1, 8869/1, 8872/1.

Parallels:
Tel Kinrot, Stratum IB: Fritz 1990: Pl. 80:3. Stratum IA: ibid: Pl. 81:10.

Jordan Rift Valley: Dan, Stratum VIIA: Ben-Dov 2011: Fig.40:14. **Hazor, area** A, Stratum 8: Bonfil 1997: Fig. II.22:5. Stratum 1: Yadin 1958: Pl. XCVI: 10. Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Fig.1.5:5. Stratum Xb: Ben-Ami 2012: Fig.2.4:7. Stratum Xa: Ben-Ami 2012: Figs.2.7:14; 2.9:6; 2.10:10. Stratum IXa: Ben-Ami 2012: Fig. 2.18:15, 17. Stratum IX: Yadin 1969: Pl. CCXII: 23. Stratum VIII: Yadin 1958: Pl. XLVII: 25–26, 31; area A, Stratum 5: Bonfil 1997: Fig. II.38:5–6. **Tel Yin'am,** Stratum XIII: Liebowitz 2003: Fig. 2:4. Stratum XIIB: ibid: Fig.9:4. Stratum XII: ibid: Fig.19:4. Stratum XIIA: ibid: Figs. 28:6; 47:3. **Tel Zarᶜa**, Phase IV.4: Dijkstra/Dijkstra/ Vriezen 2009: Fig. 4.4:10. **Tel Beth Shean,** Level VII: James/McGovern 1993: Figs. 21:1, 3; 43:5. Level VI (N-3b): Panitz-Cohen 2009: Pls.10: 16; 12:15; (S-5) 21:2; (S-4): Pl. 26:3; (S-3): Pl. 40:1.Level IV: James 1966: Fig. 68: 13–16; 69: 5–13. **Pella**, Phase II: Smith/Potts 1992: Pl.49:11. **Tell Abu al-Kharaz**, Phase XI: Fischer 2013: Fig. 79: 7–8. **Tell Deir ᶜAlla,** the Late Bronze Age Sanctuary, Phase E: Franken 1992: Fig.7-18:169, 176–179. **Tell Deir ᶜAlla,** the Iron Age habitation, Phase F: Franken 1969: Fig. 61:62–63. **Tell es-Saᶜidiyeh**, Stratum VII: Pritchard 1985: Fig. 1:2–3. Stratum VI: ibid: Fig. 8:2. **Tall al- ᶜUmayri**, Integrated Phase 11: Herr 2000: Fig.3.10:5. Phase 9: ibid: Fig. 3.23:7.

Jezreel Valley: **Megiddo,** Stratum VIIA: Finkelstein/Zimhoni 2000: Fig.10.2:13; Arie 2013a: Fig. 12.61:1. Stratum VIA: ibid: Fig. 12.91:5. Stratum VB: Arie 2013b: Figs.13.31:12; 13.35:10. **Yoqneᶜam**, Stratum XII: Zarzecki-Peleg 2005: Fig. I.80:29. **Tel Qiri**, Stratum VIII: Ben-Tor/Portugali 1987: Figs.28:2; 18:1. Stratum VII: ibid: Fig.10:17.

Fig. 5.48 Carinated Krater 14380/1

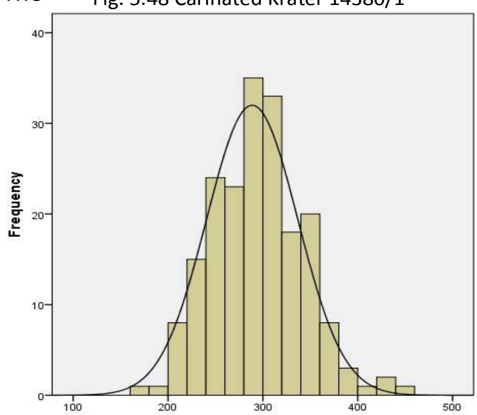


Fig. 5.49 Distribution of the diameter (in mm) of the Carinated kraters (material from the KRP), n=193.

KR04: Carinated Kraters

At Tel Kinrot, this type of krater (Fig. 5.49) is the most common one, with 213 vessels (195 items; 67 % of kraters in areas U & W). It is also the most coherent type of krater. This is the type that was easiest to identify at Tel Kinrot, and it is also the type that has the most similar and distinctive parallels from the other sites. The comparable types also represent the majority of kraters at other sites, such as at Tel Qiri (Hunt 1987: 194–196), Yoqneʿam (Zarzecki-Peleg et al. 2005: 263–265, 271), Megiddo (Martin 2013: 368; Arie 2013a: 490; Arie 2013b: 686), and Tel Beth Shean (Panitz-Cohen 2009: 214–220). It is a type that presents a cross between bowls and kraters (if such a biological term, referring to two distinct species that can cross-fertilize, is appropriate). Carinated kraters never have handles. The vessels of this type have thin walls compared with other krater types (4–11 mm, in average 7 mm), and their maximum width at the shoulder of ca. 34–40 cm clearly exceeds their height at ca. 18–19 cm: these features would support their definition as bowls. However, their large size (diameter over 22 cm), closed upper part, and thickened rim fit the definition as kraters. I have also defined the type as a krater in order to make the comparisons to material from other sites more transparent, as most reports have considered the parallel type as a krater. The Carinated kraters are wide and have an inverted upper part, clear shoulder, and thickened rim. The width of the shoulder exceeds the diameter of the opening by a few centimeters, and the shoulder is situated above the mid-body. Almost half of the carinated kraters are 28–31 cm wide at the rim (see Fig. 5.49), and about 90 % of the vessels have a rim 22–36 cm wide. There are a few smaller (e.g. 5033/1, 9118/2, 10130/1) and wider (e.g. 8681/1, 10140/1, 14025/1) vessels. Most of the Carinated kraters are of the same size as the biggest cyma-shaped bowls (BL09), which are also morphologically close. At Tell Deir ʿAlla, comparable vessels were considered as deep bowls (Franken 1969).

The rim is generally upright, although slightly inverted and everted rims do occur. The rim form is usually triangular, resembling those of the Iron I Cooking pots – as noted by many (Hunt 1987: 194; Yadin & Geva 1986: 56; James & McGovern 1993: 72; Liebowitz 2003; Mullins 2007: 418). At Tel Kinrot, the rims differ from those of the cooking pots by being less sharp: most rims are simple or somewhat rounded triangular in section (e.g. 9265/1, 8681/1), while many are rounded and thickened (e.g. 8797/1, 9589/1, 12059/3). These two rim variations form a clear majority of the KR04 in areas U/W: 88 rims (46 %) are rounded and thickened, while 81 rims (42 %) are simple and triangular. Pinched (e.g. 10733/2) or grooved (12032/1) rims occur occasionally. Sharp, over-hanging triangular rims are rare (e.g. 10402/1, 10468/2, not illustrated; 8 rims in areas U/W). The lower part of the body is always rounded, and the vessels stand on low ring bases. These vessels at Tel Kinrot are always plain, without surface treatment. The clay body is strongly tempered with small to medium-sized basalt inclusions, and to lesser extent with chalk in medium to coarse sized particles. The tempering set seems to be fixed, and is the clearest point of difference from cooking pots within the shard material, along with the color. The color is pale buff, bright and yellowish compared with cooking pots (darkness values at 6–8 in MSCC, while cooking pots have values at 5). The capacities calculated for kraters from Early Iron Age Tel Beth Shean of roughly similar size and form ranged from 6 to 9 liters (Panitz-Cohen 2009: 219).

Carinated kraters are common at many sites Israel during the Early Iron Age, especially in the northern: Tel Beth Shean (Panitz-Cohen 2009: 218–220), Megiddo (Arie 2006: 196; Martin 2013: 368–370; Arie 2013a: 490–491; 2013b: 684–687), and Yoqneʿam (Zarzecki-Peleg & al. 2005: 263). The type appears already during the late phases of Late Bronze Age II at Tel Yinʿam (Liebowitz 2003: 119), and continues in lesser quantities (and often slipped) into Iron Age II at Megiddo (Arie 2006: 196; 2013b: 490). At Tel Kinrot, the Carinated krater (KR04) appears already in the Foundation Phase of the Iron Age city in small amounts. It is abundant in the Main Iron I Horizon and common within the small assemblage of the Post-destruction Phase.

<u>Distribution:</u>
Foundation Phase: 8027/1, 12126/16.
Main Iron I Horizon: 4815/6, 4835/1, 5109/1, 6497/1, 7070/1, 8193/5, 8717/1, 8733/1, 8797/1, 9118/2, 9265/1, 9589/1, 10130/1, 10410/1, 12630/1, 14025/1.
Main Iron I Horizon, Earlier Phase: 10239/27, 10243/23, 10310/2, 10410/3 (not illustrated), 10416/1, 10509/4 (not illustrated), 10643/7, 10733/1, 10733/2, 14380/1, 11532/1.
Main Iron I Horizon, Later Phase: 10404/6 (?), 10563/1, 10947/2, 12049/6, 12111/23, 12133/2, 12159/7.
Post-Destruction Phase: 5033/2, 8681/1, 8871/3, 10282/7, 12139/13, 12142/1, 12149/7.
Later deposits: 4031/3, 4035/5 (E1), 10262/1, 10428/4 (not illustrated), 12032/1, 11573/3.
Natural fill below the Surface: 12059/3.

<u>Parallels:</u>
Tel Kinrot, Stratum VI: Fritz 1990: 27, Pl.56:1. Stratum IV: ibid: Pl. 59:1; 84:9.

Jordan Rift Valley: **Dan,** Stratum VII: Ben-Dov 2011: Figs. 36:4–5; 37:5; 40:13; 66:2; 70:5. Stratum VI: Ilan 1999: 75–76, Pl. 51:6 Stratum V: ibid: Pls. 25:11; 27:5; 35:10; 39:6. Stratum IVB: ibid: Pls. 10:6; 11:4; 12:3. Parallels are of types KR4 and KR5. **Hazor**, Stratum 1: Yadin 1958: Pl. CXXVII: 11. Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Figs.1.1:8; 1.8:3. Stratum IXb: Ben-Ami/Ben-Tor 2012: 419, Fig. 5.3:1 (Type I Carinated Krater with triangular rim). **Tel Hadar,** Stratum IV: M. Kochavi/E. Yadin pers. comm. **Tel Yin'am,** Stratum XIII: Liebowitz 2003: Fig. 3:4, 6–7. Stratum XIIB: ibid: Figs. 8:6; 9:3, 5; 21:7; 48:3. Stratum XII: ibid: Figs.20:3–4, 6; 25:6, 8; 26:9. Stratum XIIA: Figs. 28:2; 31:3; 32:4; 35: 6–7; 36: 8; 39: 1; 41: 4; 42: 7; 45: 1–3; 46:1. Post-Stratum XII: ibid: Fig.21:8. Stratum XIA: Liebowitz 1979: Fig. 7:5. **Tel Zarᶜa**, Phase IV.5: Dijkstra et al. 2009: Fig. 4.5:14 **Tel Beth Shean,** Level IXB (R-1b): Mullins 2007: Pl. 68:11. Level IXA (R-1a): ibid: Pl. 74:10. Level VII: James/McGovern 1993: Fig. 43: 4, 6. Late Level VII (N-4): Panitz-Cohen 2009: Pl.1:12. Level VI: James 1966: Figs. 49:14, 19; 52:17; 53:22; 54:2; 55:9; 58:14; (Stratum 4) Yadin/Geva 1986: 56, Fig. 23: 3–5; (N-3b) Panitz-Cohen 2009: Pl.11: 7; 13: 1–2; (S-4) Pl. 26: 6–7; 29: 10–11; (S-3) Pl. 38:5; 40:2; 43:8; 49:13; 56:20–21; 65:2; 67: 2–3, 5.Late Level VI-Lower V (S-2): ibid: Pl. 69:7–8. Lower Level V: James 1966: Fig. 18:4. Stratum 1: Yadin/Geva 1986: Fig. 6:8, 11. Upper Level V: James 1966: Fig. 7:7–8. The parallels are mainly of type KR74 (Panitz-Cohen 2009: 218–220). Parts of Level V (S-1b): Mazar 2006: Pl.6:15. **Tel Rehov**, Stratum VII (D-4–3, C-3): Mazar/Bruins/ Panitz-Cohen/Plicht 2005: Figs. 13.7:7. Stratum VI: ibid: Fig.13.18:10. **Pella**, Phase IA: Smith/Potts 1992: Pl.52:9. Stratum 8 in area VIII: ibid: Pl. 64:8. Stratum 7 in area VIII: ibid: Pl. 65:6. Phase Oa: ibid: Pl. 67:3. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 283: 3–4; 285: 1–4; 286: 1–5; 288: 1–3. Phase XI: ibid, Fig. 105:2; 370: 8. **Tell Deir ᶜAlla,** the Late Bronze Age Sanctuary, Phase E: Franken 1992: Figs.7-17: 122–123, 126; 7-18: 130–134. Phase E8: ibid: Fig. 5-5:10; 5-6:12–13. Phase E9: ibid: Fig. 5-9: 12. Phase E10: ibid: Fig. 5-13: 11–12. Phase F: ibid: Fig. 7-21:30, 32–35. **Tell Deir ᶜAlla,** the Iron Age habitation, Phase A: Franken 1969: Fig.46:5–10, 12–18. Phase B: ibid: Fig. 49:16–29, 41–44, 47. Phase C: ibid: Figs. 53:61–63, 66, 69; 54:1, 8–9, 12–13, 21. Phase D: ibid: Fig. 56: 45, 51–53, 55; 57:45. Phase E: ibid: Fig. 59:24–25, 28–33, 36–37, 40, 42–45, 47–49. Phase F: ibid: Fig 61: 48–49, 55–57, 59. Phase G: ibid: Fig.64:21–23, 27–31, 34, 38, 44. Phase H: ibid: Figs.68:2; 77:1, 13–17. Phase J: ibid: Fig. 77:26 – 28. Phase K: ibid: Fig. 77:37. This type is considered Deep bowl, parallels are mainly of sub-types 1 and some examples of sub-types 2 and 3a. **Um-ad-Dananir**, burial Cave 3B: McGovern 1986: Fig.35:5. **Tell es-Saᶜidiyeh**, Stratum VII: Pritchard 1985: Fig. 1:18. Tomb 105L of the earliest period: Pritchard 1980: 29, Fig.9:7.

Jezreel Valley: **Megiddo,** Stratum VIII: Loud 1948: Pl.61:23 (=Finkelstein/Zimhoni 2000: Fig. 10.4:1). Stratum VIII–VIIB (F-9): Ilan/Hallote/Cline 2000: Fig. 9.11:1–2, 4, 7. Stratum VIIA: Arie 2013a: (Type 1) Fig.12.62:4. Stratum VIB: Arie 2006: Fig.13.51:4–5; Arie 2013a: Fig. 12.73:4. Stratum VIA: Arie 2006: Figs. 13.63:8; 13.66: 5–6; 13.69:2; Finkelstein 2006: Fig.15:3; (F-5) Finkelstein/Zimhoni/Kafri 2000:Fig.11.2:6; Loud 1948: Pl.78:14 (=Finkelstein/Zimhoni/Kafri 2000: Fig.11.10:4. Burial 98/K/40: Arie 2006: Fig. 13.70:7; Arie 2013a: Fig. 12.90: 1–2; 12.91:5. Stratum VB: Arie 2013b: Fig. 13.33:3; 13.35: 1–6; Finkelstein/Zimhoni/Kafri 2000: Fig.11.18:13–15; Lamon/Shipton 1939: Pl. 32:161, 163. Stratum VA–IVB: Arie 2013b: Fig.13.47:4; 13.50:12. **Yoqneᶜam**, Stratum XXa: Ben-Ami 2005: Fig. III.8:10. Stratum XIXa: ibid: Fig. III.19:3; III.23:9. Stratum XVII: Zarzecki-Peleg 2005: Fig.I.9:7; I.14:22; I.120: 5–6; I.25:16. Stratum XV: ibid: Fig. I.49:12; I.54:1. Stratum XIV: ibid: Fig. I.61:8. The parallels are of type KIA (Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor: 263–264). **Tel Qiri**, Stratum IX: Ben-Tor/Portugali 1987: Fig.20:2. Stratum XIII/IX: ibid: Fig. 29:6–7. Stratum VII: ibid: Fig. 24: 1–2. Stratum V/VI: ibid: Fig. 23:5. **Ta'anach,** Period IA: Rast 1978: Figs. 1:9; 4:10; 7:3. Period IB, ibid: Fig. 12:2. Period IIA: ibid: Figs. 24:4; 28:2–4.

Central Hill Country: **Tell el Far'ah**, Stratum VIId: Chambon 1984: Pl. 54:5.

Phoenician Coast: **Tell Keisan,** Level 11: Puech 1980: Pl.81:11, 11a–d. Level 9c: ibid: Pl.79: 14k. Level 9c, Pit 6067: ibid: Pl. 78:2, 2a–j. Level 9a-b: Briend 1980: Pls.64: 1. 1a–h, 2, 2a–f, 4, 4a–e, 5, 6, 8a; 65:9. **Tel Dor**, Ir1a*late* horizon: Gilboa/Sharon: Fig.2:15. Irb horizon: ibid: Fig.7:23–25;

Phase 7d–b: Gilboa/Sharon/Zorn 2004: Fig. 5:14; Phase 7a: ibid: Fig.7:28–29. Ir1| 2 horizon: Gilboa/Sharon 2003: Fig.10:11–15. Ir2a horizon: ibid: Fig.12:12. Parallels are of type KR21 (Gilboa/Sharon 2003: 26). **Tyre,** Stratum XIV: Bikai 1978: Pl. XLI:6; XXXIX:27. **Sarepta,** Stratum F: Anderson 1988: Pl.30:7.

KR05: Bell-shaped Kraters

These kraters have a similar body form to that of bell-shaped bowls (BL04A) – as far as it can be deduced from the fragmentary material. The upper part of the vessel is slightly sloping inwards, almost upright. The rims are thickened on both sides. The thickening on the exterior is bigger than on the interior, but not very pronounced or hammer-shaped. The diameter of the mouth ranges from between 25 and 35 cm, and the size is thus bigger than that of the Bell-shaped bowls. The wall thickness is 5–9 mm, and the rim thickness is about double the wall thickness. No examples with a full profile were found at Tel Kinrot. However, the material deserves a type of its own, as comparable groups are abundant on other sites, especially on the Mediterranean coast.

Fragment 10239/10 (Fig. 5.50) has a vestigial horizontal handle. Four larger rim fragments are all plain, with no surface treatment discernible. Two small fragments are decorated: one with red painted triangles close to the rim (10311/1). One body shard of exceptionally fine ware (12116/2) has a white slip and brown painted decoration. This decoration shows a stylized palm tree and antithetic spirals on its sides – features that are rare in the "Philistine" repertoire, but attested at Qasile, Azor, and Tell es-Safi. The palm-tree motif recalls the local Late Bronze Age tradition. The white slip is a typical phenomenon for Philistine bowls and kraters. The white slip is especially common at Qasile XII, and to lesser extent in later strata. Trude Dothan attributed the popularity of white slipped bowls to the zenith (phase 2) of the Philistine material culture, and dated it to the end of the 11th century – the beginning of 10th century BCE (Dothan 1982: 96, 98). The Bell-shaped kraters indicate some relation to the coastal region in style. With the exception of the white slipped body shard made of fine ware, the fragments from Tel Kinrot are rather strongly tempered, mainly with basalt and chalk, and to some extent also with quartz particles. The macroscopically observed ware does not differ from the common local ware.


Fig. 5.50 Bell-shaped krater 10239/10

Distribution:
Foundation Phase: 12116/2.
Main Iron I Horizon, Earlier Phase: 10511/3 (not illustrated).
Main Iron I Horizon, Later Phase: 10239/10 (=10243/5), 10311/1.
Natural fill below the Surface: 12040/6.

Parallels:
Jordan Rift Valley: **Tel Beth Shean,** Level S-3: Panitz-Cohen 2009: Pl. 63:15.

Phoenician Coast: **Tell Keisan,** Level 9c: Puech 1980: Pl.80: 12.

Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: Fig. 13: 15–16, 18–21, 22, 24–26. Stratum XI: ibid: Fig. 23:4. Parallels are mainly of type KR2a, some of 2b (Mazar 1985: 90 – 92). **Azor**, Philistine cemetery: Dothan 1982: 115, Fig.10:3. **ʿIzbet Sartah**, Stratum III: Finkelstein 1986: Fig. 13:1 Stratum II: ibid: Figs. 15:3; 17:4. Stratum I: ibid: Fig. 20:14. **Tell es-Safi,** Phase E3 (pits): Zukerman 2012: Pl.13.2:12, 14. Phase A5: ibid: 283–285, Pl.13.5:12. Phase A3: ibid: Pl.13.11:1–2.

KR06: Wide, Open Thick Rimmed Kraters

I have divided the fragments of wide and open krater types into two subtypes, according to body form, presence of handles, and decorative treatment on the rim. They are all open vessels with thick walls and coarse ware, and seem to be rooted in the Middle and Late Bronze Age traditions.

KR06A: Shallow Bowl-kraters with Handles/Scoops

These vessels are wide and shallow. The rim is 28–44 cm wide. They have prominent loop handles stretching from rim to the lower part of the body. Walls are thick (8–12 mm), and the rim is usually prominent. The body form varies: two vessels have a rounded profile (9570/1, 9571/1) and two vessels have an angle at the point where the handle joins the body (9587/1, 10288/1). One vessel falls between these two variations (10029/5, Fig. 5.51). The rim is thick, forming a broad ledge in three of the vessels. All three of the vessels from stratum VII derive from locus 6195. They have organic temper in addition to some mineral particles. The vessels from the Iron Age layers are tempered with mineral particles of varying degrees. Krater 10288/1 is strongly tempered with basalt, and to a lesser extent with particles of chalk, typical for the pottery of the Iron Age layers at the site, while kraters 11250/8 and 10029/5 have little temper. Shallow bowl-kraters occur during the Middle and Late Bronze Ages, and sporadically during the Early Iron Age. These wide and shallow vessels may also be scoops. This asymmetric vessel is attested from the Late Bronze Age until Iron Age II (Mazar 2015: 10–11; Ben-Tor & Zarzecki-Peleg 2015: 139). However, the material is too fragmentary to be securely identified as scoops. The asymmetric form of a scoop – the rim turned in on one side and flaring on the opposite one, cannot be positively attested.


Fig. 5.51 Shallow Bowl-krater 10029/5

Distribution:
Stratum VII: 9570/1, 9571/1, 9587/1.
Main Iron I Horizon (Earlier Phase): 10288/1; 11250/8 (L6417).
Post-Destruction Phase: 10029/5.

Parallels:

Jordan Rift Valley: **Dan**, Stratum X: Biran 1994: Fig. 67:1. **Hazor,** Stratum 3: Yadin 1958: Pl. CXXIII: 14. Area L, Phase XVIIB: Garfinkel 1997: Fig. III.9:3. Stratum 1A–B: (Cooking pot) Yadin 1960: Pl. CXLII: 5. Stratum X: Yadin 1960:Pl. LI: 9. Stratum Xa: Ben-Ami 2012: Fig.2.10:9. Stratum VII: Yadin 1960: Pl. LIV: 18; (Area A, Phase 5A): Bonfil 1997: 119, 125–131, 150; Figs. II.39: 2, 6; II.40:8; (Area A, Phase 4B): ibid: Fig. II.40:8. **Tel Yin'am,** Stratum XIIB: Liebowitz 2003:6:3. **Tel Beth Shean**, Level XI–X (R5–4): Maier 2007: Pl. 9:13. Level X (R3–4a) ibid: 25:7 (cooking pot). Level XA (R3): ibid: Pl. 28:13; 32:20–21.Level IXB (R-1b), Mullins 2007: 415, Pl. 64:2. Level VI (S-3): Panitz-Cohen 2009:Pl. 41:1.

Central Hill Country: **Tell el Far'ah**, Stratum VIIe: Chambon 1984: Pls. 54:8; 56:2. **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Fig.6.52:5.

Phoenician Coast: **Tyre,** Stratum X-2: Bikai 1978: Pl.XXVII:3.

Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: Fig. 14:5. Stratum XI: ibid: Fig. 24:15. Stratum IX: ibid: Fig. 53:6.

KR06B Wide Kraters with Thick, Incised Rim

Three thick rimmed, open fragments have an incised or impressed fish-bone pattern on the upper rim surface and on the side. The rim is thickened on both sides. The opening is 34 (6018/14, 6091/14, Fig. 5.52) or 42 cm (12098/6, 6851/1) cm wide. Rim 6851/1 has impressed circles instead of the incised fish bone pattern. A pithos rim from Tel Dan, stratum V has small incised dots on top of the rim (Biran 1989: Fig. 4.1:3). The clay body is tempered with mineral particles, mainly small inclusions of basalt and larger ones of chalk. This kind of krater seems to be typical for the Late Bronze Age. Few parallels derive from Iron Age contexts. As the material consists of rim shards only, they may be residual.

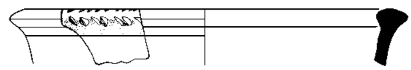


Fig. 5.52 Krater 6091/14

Distribution:
Foundation Phase (fill of): 6018/14.
Main Iron I Horizon: 6851/1, 12098/6.
Surface: 6091/14.

Parallels:
Jordan Rift Valley: **Hazor**, area A, Phase 8: Bonfil 1997: Fig. II.20:16. **Tel Beth Shean**, Level X (R4): Maier 2007: Pl. 25:2. Level VII: James/McGovern 1993: Fig. 39:5.

Jezreel Valley: **Yoqneᶜam**, Stratum XXb: Ben-Ami 2005: Fig.III.2:29. Stratum XV: Zarzecki-Peleg 2005: Fig. I.57:37 (Krater rim with impressed circles).

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Fig.6.60:3.

KR00 Kraters of no closer definition

I also created a group for those rim shards that were too small to be classified under the defined types. Most of the fragments included in this group are small rim shards that indicate a wide diameter and a thick rim, while the body form remains completely unknown. Some wide body shards with raised reliefs were included as well. The low number of items included in this group (6) reflects the wide definitions of the types above, that have admittedly resulted in a high variety of forms and sizes within some types, especially within the inverted kraters (KR03A and KR03B) and to some extent within the Kraters with everted rim (KR01). Using narrower type definitions would have introduced more types by dividing the Kraters with everted rim part (KR01) and the Inverted kraters (KR03A and B) into several subtypes. As a consequence, I would have had several types with very few vessels in them and the vast majority of items in a large group of unclassified kraters. However, it is often difficult to make any use of a broad group of unclassified fragments. With broad type definitions, I could use the features that I was able to observe on most fragments: the rim witdth and direction of the rim part. As a result, we are able to see that the Inverted kraters of different size variations occur side by side, without a difference in their chronological distribution at Tel Kinrot (see Fig. 5.41). Similar division into smaller and larger vessels of the Kraters with everted rim part (KR01) did not appear to me a reasonable solution, as the distribution of their rim diameter was fairly normal with one peak, and the sub-type of small size would have included only few small fragments and no well preserved vessels at all. Setting the division e.g. at the same width of 27 cm as with the Inverted kraters would have left ten rim shards in the smaller sub-type.

5.2.3 Cooking and Baking Vessels

Cooking pots are a common vessel group with a distinctive ware, form, and use-wear related to their use, and are easy to identify. They form a homogeneous group – most of the vessels from Tel Kinrot are open cooking pots common throughout the region from Late Bronze Age II to the beginning of Iron Age II. The total of items that the KRP excavations identified as cooking pots is 624 (25 %), and a further 107 were registered by the Fritz excavations. Illustrations are included in Appendix 5E. Their state of preservation is mostly poor at Tel Kinrot, as well as at other sites in general. There are nine whole or almost whole items that derive mainly from the Main Iron I Horizon, and another 31 vessels include a whole or almost-whole profile (a profile from the rim to the lower third of the body, below the shoulder). The fragmentary nature of the material is a result of their use and frequent breakage (see also Hunt 1987: Panitz-Cohen 2009: 225; Martin 2013: 372–373). Fig. 5.54 shows the interior surface of one of the few cooking pots with a preserved base. The inner surface has use wear resulting from frequent thermal exposure, damaging the surface so that it started to crack and exfoliate. Cooking pots usually have traces of contact with fire: e.g. soot on the surface, especially on the exterior. The darkening is clear both on the interior face and outside below the rim. The color of the cooking pots also hints at constant heating. While most of the other vessels are of light brownish shades, the cooking pots are dark brown or dark reddish brown in color. The dark color is also present in the matrix. The friable constitution is at least partially a result of the hard use of the vessels.

Fig. 5.54 Bottom of cooking pot 10631/1 showing irregular finger marks and use wear on the inner surface.

The rate of breakage and discard affects the amount of cooking pots in archaeological context. Cooking pots (like bowls) have a relatively short lifespan. Therefore, they are over-represented in the archaeological record when compared to their frequency in a living, systemic context (Shott 1989: 14–15; David & Kramer 2001: 100; Silva 2008: 254–255). The amount of fragments is also affected by the vessel shape: the wide form of most cooking pots will likely result in many rather small pieces when broken. The thin and friable base rarely survives, so that the shards would be identified and regarded as diagnostic. In the intensively collected areas, the proportion of larger fragments (eight were preserved from rim to shoulder or more) of all the 540 identified cooking pots is 1.5 %. The comparable ratio for bowls is 1.8 %, and for storage jars and jugs 4%, while for the small closed vessels the ratio is 36.3%. The ratio of well-preserved items to all items in the group seems to relate to vessel form and size.

Because I was aware of the high breakage rate of the cooking pots, I made an effort to find joining rim shards, and joining fragments were counted as one shard. There were also fragments that were equal in all details concerning the rim form, thickness, color, and inclusions. If these shards derived from the same loci and looked exactly similar when compared as actual fragments, I also counted them as one shard. Still, most likely some vessels have been counted twice because of small differences in the rim part of the same vessel. This is also the case with other sites using rim counts, and the frequencies counted at Tel Kinrot are comparable to them.


Fig. 5.55 over-hanging, grooved rim showing the typical CP-ware.

The cooking pots have a mineral tempering identified macroscopically as quartz (Fig. 5.55), usually in a considerable amount. The thermal conductivity of quartz is high, as is its expansion rate when heated (Arnold 1985: 23–24). The first may be a desired feature for cooking pots, but the latter makes the vessels less durable. No petrographic analysis has been done on this point of study. Quartz has also been identified as typical cooking pot temper at Yoqne'am (Zarzecki-Peleg et al. 2005: 272), Tel Qiri (Hunt 1987: 181), Tel Keisan (Briend & Humbert 1980, Pls. 63 and 77), Sarepta (Anderson 1988: 220), and group 3 at Tell Deir ʿAlla (Franken 1969: 128). The tempering is characterized by angular and shiny inclusions that are harder than the soft and rounded particles identified as chalk. However, there are other minerals that look similar, like calcite crystals identified petrographically in the cooking pots at Tel Beth Shean (Cohen-Weinberger 2009: 520). At all sites from which the ware has been discussed, the cooking pot ware is considered distinctive (in addition to the ones mentioned above: Franken 1969: 119, 124, 128, 131; Amiran 1969: 227; Mazar 1985: 51; Mazar & Panitz-Cohen 2001: 20–21; Panitz-Cohen 2006: 14–15; Panitz-Cohen 2009: 227; Arie 2006: 202; Martin 2013: 373). The cooking pot ware usually differs from that of the other vessel groups in a wide geographic area. The use of different clays and tempers for vessels of different functions is widely known in ethnographic studies (Rice 1987: 226), though this is not universal (Kramer 1997: 56).

Franken suggested that the bowl-bases of the wide cooking pots at Tell Deir ᶜAlla were made of a thin clay sheet in a mold, and the shoulder and rim parts by coiling, and that the wheel was used when finishing the vessel (Franken 1969: 119–121). The few preserved bases from Tel Kinrot seem to support molding as well, as there are irregular parallel lines on the bottom and subtle differences in the inner surface, as signs of beating the clay sheet in a mold (Fig. 5.54). The rim parts have thin parallel lines as traces of wheel working, which might result from the finishing. The body form of the cooking pots bears little variation, which is most likely due to manufacturing techniques as well as cooking methods. Vessels were probably placed on a tabun. Gustav Dalman has presented ethnographic parallels from Palestine from the late 1930's (1964: 196–198, illustrations 97–100).

Typologies of the Iron Age cooking pots in the region are hierarchic (e.g. Panitz-Cohen 2009, Arie 2006, Zarzcecki-Peleg et al. 2005). The first division is based on the body form of the vessel, as a wide and open or globular and closed vessel. Sub-types are based on differences of the rim part, but the sub-types at different sites are not equivalent. The minor variations in the rim part may result from differences in individual processes, or between different potters in the neighboring or even in the same workshops with slightly different finishing techniques (Panitz-Cohen 2009: 225). The natural variability in minor details of the rim part, even from the same potter trying to produce similar vessels, could produce "different rim types" (Miller 1985: 40–44, Fig. 9). The arbitrary and haphazard nature of this variation was already recognized by Franken (1969), who presented the cooking pots only in few widely defined types with little emphasis on the variations in the types. The Tell Deir ᶜAlla cooking pots were divided into three types, of which one is defined as a Late Bronze Age type, but is grouped together with the two Iron Age types due to its proximity to one of them. The two wide Iron Age types are morphologically close, and differ from each other mainly in the forming of the upper part. A third Iron Age type is globular, and also differs from the two wide types in its tempering (Franken 1969: 119–129). According to Franken, any subdivisions would indicate tendencies of little meaning in the making process of the vessel (Franken 1969: 129). Small variations of the rim form have not been a meaningful feature when searching for chronological or regional patterns in cooking pots.

However, most typologies of cooking pots nevertheless rely on the variation of the rim part. This may be a necessity resulting from the fact that most cooking pots have been preserved only from the rim until the shoulder, or even less fully. At Beth-Shean the open cooking pots were divided into three types with one further subdivision. One type, CP74, is related to the Late Bronze Age types and has an everted rim part, while the other types CP70a-b and CP71 have vertical rim parts (Panitz-Cohen 2009: 227–228). The verticality is not absolute, but allows both slightly everted (Pls. 18:1; 22:8–9; 45:4) and especially inverted (Pls. 18:2; 22:14; 29:16; 38:7; 45:1, 3; 58:3; 62:4; 64:2; 69:10; 71:11; 74:1) rim parts to be included, while a majority of the vessels have a rather vertical rim part. At Dan, the definition of cooking pots is based on three different aspects of the rim: its direction, length, and form. The chronological overlap of the types is clear at the site, and only relative frequencies tend to change over the time (Ilan 1999: 78–79, Pls. 68–71). At Hazor stratum XII/XI, there were both upright and inverted cooking pot rims with much variation in rim form, and no division into types was made (Ben-Ami & Ben-Tor 2012: 22). The wide cooking pots from Megiddo were divided into two types according to the rim form (pinched or triangular), and further into subtypes according to the inverted or vertical rim stance and presence of handles (Arie 2006: 200–201). At Yoqneᶜam the broad cooking pots were divided into five main types and several sub-types. The detailed typology leaves several groups (e.g. CP IIIC2 and VC) with few vessels, and the differences between some groups (e.g. CP VA and VB, VIA and VIB) are very subtle (Zarzcecki-Peleg et al. 2005: 272–277). The Tel Qasile cooking pots with shallow body and inverted rim were divided into four sub-types according to rim form and the presence of handles. Mazar noted that different variations of the rims appear in a single stratum, and that the variations are not chronologically significant. The chronologically significant feature was the presence of the handles, which start to appear in strata IX–VII at Qasile (Mazar 1985: 53) and from stratum X on at Hazor (Ben-Ami & Ben-Tor 2012: 424), increasing in popularity in later strata (Ben-Ami et al. 2012: 453). Handles on cooking pots appear in stratum VIA at Megiddo, correlated with Qasile XI (Arie 2006: 201, 231; Loud 1948: Pl.79:6) or Qasile X (Mazar 2005: 22), and levels 9a-b and 9c at Tel Keisan (Briend 1980: 210; Puech 1980: 221; Pls. 63:1, 77:2, 5). The chronological co-occurrence of different rim forms in the same phases is also evident at Tel Kinrot. The wide cooking pots do not appear with handles at Tel Kinrot, but there are handles on the few restricted cooking pot types (CP03 and CP04).

In the light of earlier pottery studies and anthropological evidence (Miller 1985: 40–44; Rice 1987: 279; Kramer & David 2001: 157–165), I considered it reasonable to prefer broad groupings and refrain from detailed rim-type-divisions. The wide cooking pots of the Early Iron Age were divided into three groups according to the forming of the upper part (CP01, CP02A and CP02B). The rim forms were recorded separately, and they tend to differ between the types, but their relation to stratigraphy at the site did not seem to be significant (Figs. 5.66–67). The wide cooking pots have inverted or upright upper parts and a rounded base. Most of the cooking vessels are wide and open. The shoulders are usually clear and high. The size varies: the rim diameter varies between 18 and 45 cm, but most of the cooking pots have an opening between 25 and 30 cm wide (Fig. 5.65). The shoulders are a few centimeters wider. The rim is thickened on the exterior below the lip, forming a triangle in section but varying in detail. In the wide cooking pots, handles do not occur. Only few examples have been assigned to globular types with a restricted opening (CP03 and CP04). These types seem to have a restricted distribution in time, starting to appear in small quantities in the Main Iron I Horizon and increasing in popularity during Iron Age II.

CP01: Cooking Pot with Everted Upper Part and Triangular Rim

The type includes wide vessels with a flaring rim part and triangular rim. The clear shoulder is slightly wider than the opening, or they are approximately as wide. The section of the rim forms a simple and rather short triangle. The diameter of the opening varies between 18 and 36 cm, but most vessels have an opening between 20 and 28 cm. An exceptionally wide rim fragment 10609/2 indicates a diameter of 48 cm (small shard, not illustrated). Though the rim part is everted, the diameter tends to be narrower than in the other wide cooking pots (mode at 20 cm and mean at 26.6 cm). The rim is most commonly of a simple triangular shape (6119/1, 7851/1, 8473/1, 12073/5), and rarely grooved or hooked (concave on its upper side, 12126/8). The clay is strongly tempered, most commonly with quartz particles, often as the only macroscopically identified particle (73 %). There are also mixed minerals in many cases, with no clear inclination towards any specific mineral (21 %).

The continuity of similar vessel forms in phases attributed to the end of the Late Bronze Age and Early Iron Age at Tell Beit Mirsim was already noted by Albright (1932: 40, 50). At Tel Kinrot as well, this type represents continuity of the Late Bronze Age tradition. Six examples have been found from *stratum VII*. The type is less common than the other wide forms in the Iron Age layers. Some of these fragments may be residual. However, continuation of the everted type into the Iron Age has been attested at other sites (e.g. Mazar 1981: 21; Panitz-Cohen 2009: 227, Arie 2013a: 494).

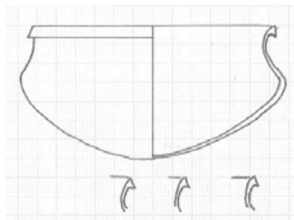


Fig. 5.56 Cooking pot CP01, prototype

Distribution:
Stratum VII: 4314/1, 4420/1, 4340/2, 9018/2, 9103/1, 11250/9.
Fill of the Foundation Phase: 6119/1.
Main Iron I Horizon: 4837/1, 7529/1, 7531/1, 7851/1, 8473/1, 8732/2, 11561/1, 12073/5, 12126/8, 12126/15.
Post-destruction Phase: 5035/15 (L2020, pit dug into Stratum V).
Natural fill below the surface: 6680/1.

Parallels
Tel Kinrot, stray: Fritz 1990: Pl.55:4–6; Stratum V: ibid: Pl. 57: 3, 9, 11. Stratum IV: Ibid: Pls.59: 9–10; 85:1.

Jordan Rift Valley: **Dan**, Stratum VI-VIIA: Pl. 62:2. Stratum VI: Pls. 48:6, 8–9; 50: 10, 12. Stratum VI?: Pls.58:7; 59:10. Stratum V: Pls. 22:8; 31:11–12; 42:5. Stratum IVB: Ilan 1999: Pls. 9:7; 12:9; 19:5 (mainly Type CP1). **Hazor,** Stratum 1: Yadin 1958: XCVI: 8; CVII: 1–8; CXXVII: 1–6; CXLV: 3–9 (stratigraphy on p. 155); Yadin 1960: CXLII: 1–4; area P, Phase B/A: Mazar 1997: Fig. V.4: 10–15. Stratum 1B: Yadin 1960: Pls. CXIX: 9–17; CXXX: 5–7; Yadin 1969: Pl. CCLXXIV: 5–8; CCXCII: 2–7; area P, Phase B: Mazar 1997: Fig.V.3: 14–17. Stratum 1A: Yadin 1958: Pls. XCII: 2–3; Yadin 1960: Pl. CXXIV: 16; Yadin 1969: Pl. CCLXXXI: 1–2; CCXCV: 5–6; area P, Phase A: Mazar 1997: Fig.V.6. Stratum XIV: Yadin 1969: CLVIII: 17 (for the stratigraphy, Stratum XIV or XIVB, see Aharoni 1989: 15 and Ben-Tor's editorial notes; Bonfil 1997: 108); area A, Stratum 7B: Bonfil 1997: Fig.II.31: 8–9. Stratum XIII: Yadin 1969: Pl. CLXIII: 1–3; Stratum 7A: Bonfil 1997: Fig.II.32: 5, 16, 20. Stratum XII/XI: Ben-Ami/ Ben-Tor 2012: Figs.1.1: 13– 4; 1.8:8. **Tel Sasa**, Stratum II: Golani/ Yogev 1996: Fig.4:2. **Tel Yin'am,** Stratum XIII: Liebowitz 2003: Figs. 1: 8–9; 2:11; 3:10. Stratum XIIB: Figs. 6:7; 8:8; 9:6; 10:3. Stratum XIIA: Figs. 31: 4–5; 32:5, 7–10; 43:2; 46:3 Stratum XII: Figs. 14:5; 20:4, 6, 11; 22: 10; 23:8, 10; (mainly types 1A and 1B). **Tel Zarᶜa**, Phase IV.2: Dijkstra/Dijkstra/ Vriezen 2009: Fig. 4.7:11. **Beth Shean,** Stratum VII: James/ McGovern 1993: Fig. 26:2–3; Q-3 (perhaps UME VII): Mazar 2006: Pl.1:5–6; 2:12; S-5 and N-3b (VII-VI early): Panitz-Cohen 2009: CP74 Pls. 11:7; 16:3–4, 6; 22: 1, 3. Late level VI: James 1966: Fig. 51:12.**Tel Rehov,** Stratum V: Mazar et al. 2005: Fig. 13.24:8. **Pella**, Phase II: Smith/ Potts 1992: Pl. 48:9. Phase IB: ibid: Pl. 50: 14–15. Stratum 8: ibid: Pl. 64:4. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig.333:1–3. **Tell Deir ᶜAlla,** Sounding X: Franken 1992: Fig.7-15:13. **Tell es-Saᶜidiyeh**, Stratum VII: Pritchard 1985: Fig. 3:33. **ᶜUmayri**, Phase 11B: Herr 2002: 145, Fig.4.12:12–16; Phase 11A: ibid: 4.16:4.

Jezreel Valley: **Megiddo**, Stratum VIIB: Martin 2013: 373–374 (types CP60a-b), Figs. 10.12:2–4;10.14:6; 10.16:9–10; 10.17: 7–10. Stratum VIIA (Level F-7): Ilan/ Hallote/Cline 2000: Fig. 9.14:10–11. Shards of the everted cooking pots from Strata VIB and VIA were considered intrusive (Arie 2006: 200) and were therefore removed from the material (Arie 2013a: 494). **Yoqneᶜam**, Stratum XIXb: Ben-Ami 2005: Fig III.14: 24–29. Stratum XIXa: ibid. Figs. III.19: 10–18; III.23: 13–14; III.24:13–15; III.26: 19–20. Parallels are of carinated types CP I and CP II (Ben-Ami/ Livneh 2005: 276–279). Stratum XVIIIa: Zarzecki-Peleg 2005: Fig.I.3. Stratum XVIII: ibid: Fig.I.6:19. **Tel Qiri**, Stratum IX: Ben-Tor/ Portugali 1987: Fig. 20:4. Stratum IX/VIII: ibid: Fig. 29: 11. Stratum VII: ibid: Figs.11: 1–2, 5–6; 12:1; 27:8. **Jezreel,** fills below the Omride enclosure: Zimhoni 1997: Figs.1:19; 6:3. **Ta'anach,** Period IA: Rast 1978: Figs.2:2–8; 3:15. Period IB, ibid: Figs. 14:11, 17:11; 24:9.

Central Hill Country: **Shiloh,** Stratum VI: Bunimowitz/Finkelstein 1993: Figs. 6:35:13; 6.36:3, 7. Stratum V: ibid: Figs.6.46: 6, 9; 6.47:1, 4; 6.50:1, 5; 6.57:6, 11; 6.59:3. **Giloh,** Building 8: Mazar 1981: Fig.7: 5, 8, 10–14.

Phoenician Coast: **Tell Keisan,** Level 11: Puech 1980: 227–228; Pl.81:8. Level 9c: ibid: Pl.77:1a, c, d, 2d. Level 9a-b: Briend 1980: 210, Pl. 63:4d. **Tell Abu-Hawam**, Stratum V: Hamilton 1935: Figs. 237, 270, 271. Stratum IV? (Chantier A): Balensi/Herrera 1985: 115, Fig.16:4. **Tel Dor**, Irb horizon, area G Phase 7d–b: Gilboa/Sharon /Zorn 2004: Fig. 6:4; Gilboa/ Sharon 2003: Fig.8:3. **Tyre,** Type CP8 appearing in Strata XV–X: Bikai 1978: 52; Stratum XIV: Bikai 1978: Pl. XXXIX: 16, 19, 22, 28. Stratum XIII-1: ibid: Pl. XXXV: 9. Stratum X-1 (fill): ibid: 10, Pl.XXIII: 13–15. **Sarepta,** Cooking pot types 13 and 14. Stratum F: Anderson 1988: 225–226, Pl. 30:3. Stratum E: ibid: Pl.31:24.

Philistine Coast: **Tell Qasile**, Stratum XII: Mazar 1985: Fig 14: 16–17. Stratum XI: ibid: Fig. 25:16 (of type CP1a) **ᶜIzbet Sartah**, Type 11. Stratum III: Finkelstein 1986: Figs. 10:16; 12:15, 17. Stratum II: ibid: Fig. 17:8. **Tell es-Safi,** CP2. Phase E4: Gadot/Yasur-Landau/Uziel 2012: 247–248, Figs. 12.8: 14–18; 12.10:8. Phase A5: Zukerman 2012: 286–287, Figs. 13.2:17; 13.4:4; 13.11:6.

Other: **Kamid el-Loz**, Phase P4–P1/P2: Penner 2006: Table 29. **Tell Afis**, Levels 10–9c: Venturi 1998: 127–128, Fig.9: 2, 3, 11.

CP02A: Cooking Pot with Inverted Upper Part and Triangular Rim

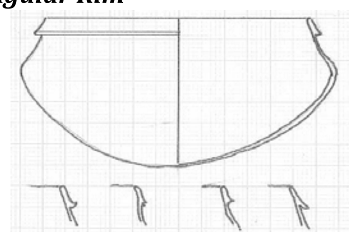


Fig. 5.58 Cooking pot CP02A, prototype

Fig. 5.57 Cooking pot 10787/2 (CP02A)

This type is the most common one, as over half of the cooking vessels can be ascribed to this type. These cooking pots have an inverted upper part and often a prominent, rather high shoulder. The rim form varies: both simple triangular rims and modeled rims are common, but there is a tendency towards modeled rim forms. The modeled rims are typically pinched or over-hanging, the latter often also grooved on the exterior (see Fig. 5.55). The pinched form is concave on the upper side and thick at the uppermost point. The inverted cooking pot form continues into the Iron Age II at many sites. The diameter of the opening of the vessel varies mostly between 22 and 40 cm, with several still wider vessels. Though this type has an inverted upper part, the diameter tends to be broader than in the other types (mode and mean at 30cm), probably indicating larger overall size. The clay is strongly tempered, with only quartz particles identified (90 %), and to some degree with other mineral particles added along with the quartz.

Distribution:
Foundation Phase: 5175/1, 5248/3, 6477/1, 6477/2, 6479/1, 6529/1, 6949/1, 8334/1.
Main Iron I Horizon: 4815/1, 4815/2, 6457/1, 6461/1 (CP02A/CP02B), 6770/1, 6787/2, 6929/1, 7015/1, 7165/1, 7426/2, 7687/2, 7687/3, 7687/4, 7846/1, 8194/1, 8195/1, 8463/3, 8715/1, 8715/2, 9036/1, 9238/1, 9575/2, 9579/2, 10284/3, 10284/4, 10462/1, 10511/1, 10609/4, 10674/10, 10679/1, 10787/2, 10735/1, 10863/8, 10946/2, 11578/2, 12055/1, 12070/2, 12073/4, 12073/8, 12073/11, 12074/5, 12080/2, 12082/1, 12089/5, 12099/1, 12099/2, 12111/16, 12111/19, 12127/1, 12127/9, 12139/8, 12182/2, 11075/10, 14405/1.
Post-destruction Phase: 6936/1, 5009/12, 5025/2, 5026/14, 8735/1, 10230/3, 10230/4, 10260/4, 10557/2, 10609/4.
Surface: 5000/4, 5021/25, 5024/7, 5024/9, 6186/1, 6186/2.

Parallels
Tel Kinrot, Stratum VI: Fritz 1990: Pl.56: 2, 8. Stratum V, ibid: 38, Pl.57:4–8, 10. Stratum IV (sealed), ibid: 39, Pl.59:6–7, 11; Stratum IV (unsealed), ibid: 39, Pl.85:2, 7, 9; 96: 4–6. Stratum III, ibid: Pl.60:7–8, 10; Stratum II: ibid 87:7–8. Stratum I, ibid: Pl.65:4–5.

Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pls. 44:3, 6; 48: 11–13; 49:6–7; 51:7; 55:5; 58:6. Stratum V: ibid: Pls. 26:5, 9; 27:3, 7; 28: 10–11; 29: 1–2; 31:9; 38:1, 7; 39:3. Stratum IVB: ibid: Pls. 1:12; 3:1; 6:3; 7:9; 8:2–3; 9:8; 10:3; 12:2, 10–11; 16:7; 17:2; 18:1. **Mt. Adir**, Stratum III: Ilan 1999: Fig.6.6:12–13, 15–16. **Hazor**, Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Fig.1.1: 16; 1.2:7–8; 1.3:5; 1.4:8, 11,16–18; 1.5: 6–7, 10, 17; 1.7:9; 1.8: 9, 13; Garfinkel 1997: Figs. III.19:2–3; III.20: 3–6; Yadin 1969: Pls. CLXV: 3–9, 12, 14–16, 19, 21, 23; CLXX: 7–8, 10–13. Pits of Stratum XII/XI, Ben-Ami/Ben-Tor 2012: 1.12:1–4, 8, 12–13; Yadin 1969: Pls. CLXV: 13, 20–21; CLXVI: 2–6; CCI: 12–17. Area A, Stratum 6: Bonfil 1997: Fig. II.33:8. Strata X–IX Type I: Ben-Ami/Ben-Tor 2012: 423. Stratum Xb: Ben-Ami 2012: Figs. 2.1:14–18; 2.2:2, 4; 2.4:9; Yadin 1969: Pl. CLXXI:20. Stratum Xa: Ben-Ami 2012: Figs. 2.8:17; 2.9: 9–10; 2.11:9; Yadin 1969: CLXXIV: 11–12. Stratum X: Garfinkel 1997: Figs. III.21: 3–7, 11–13, 15–17; Yadin 1969: CCVII: 9–10, 13. Stratum IXb: Ben-Ami 2012: Fig. 2.16: 9; Yadin 1969: CLXXV: 23, 25. **Tel Sasa,** Stratum III: Golani/Yogev 1996: Fig. 4:3. Post-destruction Phase: Stepansky/Segal/Carmi 1996: Fig. 8:1, 3. **Tel Hadar**, Stratum IV, common (pers. comm. Kochavi). **ᶜEin Gev**, Stratum V: Mazar B. et al. 1964: Fig. 4:12–13. Q-15: Sugimoto 1999: Fig. 3:4. **Tel Yin'am,** Stratum XIII: Liebowitz 2003: 124, Fig. 2:9. Stratum XIIB: ibid: Fig.8:7. Stratum XIIA: ibid: 125, Fig.32:6. **Tel Zarᶜa**, Phase IV.4: Dijkstra/Dijkstra/Vriezen 2009: Fig. 4.7:5. Phase III.i: ibid: Fig. 4.7:7. **Beth Shean**, Level VI early (Stratum 4): Yadin/Geva 1986: Fig. 25:2; N-3a: Panitz-Cohen 2009: 227–228, Pl.18:2; Stratum S-3: ibid: 38:7; 64:2. Stratum S-3b: ibid: Pl.45:1, 3. Stratum S-3a: ibid: Pls.49:14; 58:3–4; 62:4. Stratum S-3a or S-2: ibid: Pl. 67:8. Late level VI (Stratum 3): Yadin/Geva 1986: Fig. 11:7. Lower VB (Stratum 2): ibid: Fig.9: 5–7. Late Level VI: James 1966: Fig. 53:1, 6. Lower level V: James 1966: Fig.61: 14–15. Stratum S-2: Panitz-Cohen 2009: Pl. 71: 10–12; 74: 1–2. Upper level V: James 1966: Fig.66: 7–9; (Stratum 1) Yadin/ Geva 1986: Fig.7: 2–3, 5. Vessels analyzed by Panitz-Cohen 2009 are attributed to types CP70a and 70b. **Tel Rehov,** Stratum D-4: Mazar et.al 2005: Fig. 13.7:10. Stratum D-3: ibid: 13.9:6. Stratum C-1a: ibid: Fig. 13.35: 13. **Pella**, Phase IB: Smith/ Potts 1992: Pl. 50:6. Phase IA: ibid: Pl. 51:4, 6–8. Stratum 7: ibid: Pl.65:10. Stratum 6: ibid: Pl.66:6. Phase Oa-Ob: ibid: Pl.67: 4–5, 14. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig.333: 4–6; 334: 1–3, 5–7; 335:4, 7. Phase X: ibid: Fig. 366: 1–8; 367: 1–3, 5. Phase XI: ibid: Figs. 108: 1, 4–9; 109:1, 6; 145: 5; 372: 3–8. Phase XII: ibid: Figs. 116: 1–2; 375: 4–8. Phase XIV: ibid: Fig. 42:10. **Tell el-Hammah**, area A, floors: Cahill 2006: Fig. 4:4, 6. **Tell Deir ᶜAlla,** inverted specimens of types 1 and 2, Franken 1969: 120–127. Phase A: ibid: Fig.46: 1, 3. Phase B: ibid: Fig. 49: 1–6, 9–13. Phase C: ibid: Fig. 53: 50–53, 55–59. Phase D: ibid: Fig. 56: 36–37, 41–43. Phase E: ibid: Fig. 59: 1–4, 11, 14, 17, 19. Phase F: ibid: Fig. 61:42, 44. Phase G: ibid: Fig. 63: 59–60, 63–64, 74–75. Phase H: ibid: Fig. 66: 36, 39. Phase J: ibid: Fig. 69:30. Phase K:

ibid: Fig.71: 29, 33. **Tell es-Saᶜidiyeh**, Stratum VI: Pritchard 1985: Fig. 6: 22. Stratum V: ibid: Fig. 13:1–2.

Jezreel Valley: **Megiddo,** Stratum VIIA: Arie 2013a: Fig.12.61: 2. Stratum VIB: Arie 2006: 13.51:9. Stratum VIA: ibid: Figs. 13.53: 7–9; 13.56: 4–5; 13.58: 4, 11; 13.59: 5–6; 13.63: 11–15; 13.68:4; 13.69:3; Arie 2013a: Figs. 12.77:12; 12.84:2. Finkelstein/Zimhoni/Kafri 2000: Fig.11.2:10, 12. Stratum VB: Arie 2013b: 693–694, Figs. 13.35:14; 13.36:4–6; 13.39: 3–5, 8–10; 13.44: 11, 15; 13.45:9. Stratum VA–IVB: ibid: Fig.13.48:7; 13.50:6. Finkelstein 2006: Figs. 15.3:12–13; 15.6:13, 15–17; Finkelstein/ Zimhoni/Kafri 2000: Fig.11.21: 1–2. **Yoqneᶜam**, Stratum XVIIa: Zarzecki-Peleg 2005: Fig.I.4:9. Stratum XVIIb: ibid: Fig.I.4: 22–23. Stratum XVII: ibid: Figs. I.8:6; I.9: 8; I.13:11–12, 14; I.14:26–29; I.20: 12–13, 15; I.21: 3, 5; I.25:20–22, 24; I.34:11. Stratum XVI: ibid: Fig. I.36:23. Stratum XV: ibid: Fig.I.49:18–20; I.53:15; I.55:15–16. Stratum XIV: ibid: Fig.I.50:14, 24–26; I.59: 15. Vessels are mainly of types CPII and CPV (Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 272–277. **Tel Qiri,** Stratum VIII/IX: Ben-Tor/ Portugali 1987: Figs. 19:4; 29:11–12. Stratum VIII: ibid: Figs. 16:4–6; 25:5. Stratum VII: ibid: Figs.11: 10–12; 24:2. **Jezreel**, fill below the Omride floor: Zimhoni 1997: Fig.4:1. **Ta'anach,** Period IB: Rast 1978: Fig. 17:13–16. Period IIA: ibid: Figs.18:7; 19:9; 23:10; 29: 3–5.

Central Hill Country: **Tell el-Farah (N),** Level VIIb: Chambon 1984: Pl.52: 2–4. **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Fig. 6.52:12–13. **Giloh,** Building 8: Mazar 1981: Fig.7:16.

Phoenician Coast: **Tell Keisan**, Level 11: Puech 1980: Pl.81:8b-c. Level 9c: ibid: Pl.77:1,1b, e-f, 2a-c, 3a. Level 9a-b: Briend 1980: 210, Pl. 63: 1a-b, 4, 4c, 6–7, 9. **Tell Abu-Hawam**, Stratum III: Hamilton 1935: Fig. 90. **Tel Dor**, Irb horizon, area G Phase 7d–b: Gilboa/ Sharon/ Zorn 2004: Fig. 6:1–2. Phase 7a: ibid: Fig.8:1–4, 6; Gilboa/Sharon 2003: Fig.8: 4–6 (types CP07 and CP08).

Philistine Coast: **Tell Qasile,** CP1: Mazar 1985:52–53. Stratum XII: ibid: Figs.11:20; 14: 9, 12, 14–15. Stratum XI: ibid: Figs. 23:8, 10, 14–16; 24:17; 25:12–13. Stratum X: ibid: Figs. 40:17, 44:25, 28. Stratum IX: ibid: Fig. 54:20–21. **ᶜIzbet Sartah,** Stratum III: Finkelstein 1986: Figs. 10:8; 12:20–25. Stratum II: ibid. Figs. 14: 2–4; 16: 8–10; 17:12. Stratum I: ibid: Fig. 22:1. Parallels are of type 13. **Tell es-Safi,** Phase A5: Zukerman 2012: 287, Pl.13.13:10. Phase A4: ibid: Pl.13.7:15. Parallels are of types CP303, and some vessels of type 302.

CP02B: Cooking Pot with Upright Rim

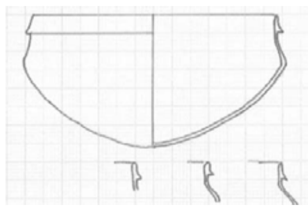


Fig. 5.59 Cooking pot CP02B, prototype.

Fig. 5.60 Cooking pot 10631/1.

The difference between the cooking pots with inverted and upright rim parts is a gradual one, and border line cases are inevitable. The division between types CP02A and B, with generally inverted body shape and triangular rims with variation in detail, is somewhat artificial. Choosing the rim stance as the main criterion for a sub-division of the type, instead of some specific rim form, seemed to me more reasonable for two reasons. First, there are not as many different variations to choose from as in the rim forms, but only one: the upright or inverted stance – in spite of the fact that they stand on a continuum without a fixed, objective point of division. Second, in the manufacturing process the joining of the rim part, and therefore the stance of the uppermost part of the vessel, takes place prior to the finishing the vessel, which affects the form of the rim. Cooking pots with an upright upper part often are almost as wide at the opening as the shoulder, the latter often remaining gentle (6497/1, 7687/1, 10631/1). The cooking pots with an upright upper part have a pronounced shoulder less often than the inverted ones. In the cases where the shoulder is pronounced, there is a gutter below the rim part that forms a neck (e.g. 7406/1, 8563/1, 4211/1). The upright cooking pots most commonly have a simple triangular rim (e.g. 8707/1, 4045/6), a pinched rim (e.g. 8078/7, 9604/3), or a ledge rim (e.g. 11075/10, 9593/1). The diameter at the rim is usually 18–38 cm (mode and mean at 28 cm). The clay body is similar to that of the inverted type (CP02A): strongly tempered with often only quartz particles recognized macroscopically (85 %), and to a lesser degree combined with other mineral particles in lesser quantities.

<u>Distribution:</u>
Foundation Phase: 7406/1, 7406/2.
Main Iron I Horizon: 5124/1, 5126/1, 6497/1, 7238/1l, 7359/1, 7372/1, 7413/1, 7429/1, 7500/1, 7687/1, 7687/5, 8078/5, 8078/7, 8216/7, 8135/3, 8707/1, 8732/1, 8735/1, 9268/1, 9275/1, 9279/2, 9575/2, 9579/1, 9399/1, 9593/1, 9604/3, 9621/1, 10305/3, 10308/24, 10607/1, 10631/1, 10756/1, 10756/5, 11538/2, 12073/1, 12073/12, 12098/7, 12127/1.
Post-destruction Phase: 4045/6, 7646/1, 7647/1, 8560/1, 8563/1, 10267/2.
Surface: 14256/1 (S: 1768). *Natural fill below the surface:* 4211/1, 10234/3.

<u>Parallels</u>
Tel Kinrot, Stratum VI: Fritz 1990: Pl.56: 7. Stratum V, ibid: 38, Pl.57:3, 9; 94:4–6. Stratum IV (sealed), ibid: 39, Pl.59:3–5, 8; Stratum IV (unsealed), ibid: 39, Pl.85:3–5, 8; 95: 11. Stratum III, ibid: Pl.60:6, 9; Stratum II: ibid: 87:9, 11. Stratum I, ibid: Pl.65:4–5.

Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pls. 48:8; 50:12; 56:1; 57:2. Stratum V: ibid: Pls. 21:4; 22:8–9; 25:15; 26:10; 28:8; 30:4; 33:7; 35:1; 39:1; 41:4. Stratum IVB: ibid: Pl. 5:2. **Hazor,** Stratum XII/XI: Ben-Ami/ Ben-Tor 2012: Fig.1.1: 17; 1.3:7; 1.4: 11, 13; 1.5:9, 11; 1.7:8; 1.8:10–11; Garfinkel 1997: Fig. III.20: 7, 10, 16; Yadin 1969: Pls. CLXV: 17, 22; CLXVI: 1, 8; CLXX:9; CCIII:7, 10. Pits of Stratum XII/XI, Ben-Ami/ Ben-Tor 2012: 1.12: 5–6, 11; Yadin 1969: CLXV: 22. Strata X–IX: Type II: Ben-Ami/ Ben-Tor 2012: 423. Stratum X: Garfinkel 1997: Figs. III.21: 14. Stratum Xb: Ben-Ami 2012: Fig.2.2:3; Stratum Xa: Ben-Ami 2012: Fig. 2.6:23; 2.8:16; 2.12:14–15. **Tel Sasa,** Stratum III: Golani/ Yogev 1996: Fig. 4:1–2. **Tel Hadar,** Stratum IV, rare (pers.comm. Kochavi). **Tel Yin'am,** Stratum XIII: Liebowitz 2003: Fig 2:8. Stratum XIIB: ibid: Fig.4:1. Stratum XII: ibid: Figs.14:4; 26:11. **Tel Zarᶜa**, Phase IV.5–4; 2: Dijkstra/Dijkstra/ Vriezen 2009: Fig. 4.7:1, 3–4, 9. Phase II.2: ibid: Fig.4.7:10. **Beth Shean**, Level VI early (Stratum 4): Yadin/ Geva 1986: Fig. 25:1; Stratum N-3a: Panitz-Cohen 2009: Pl.18:1; Stratum S-4: Panitz-Cohen 2009: Pl.26:8; Stratum S-3: ibid: 38:6; 64:3; Stratum S-3b: ibid: Pl.45:2. Stratum S-3a or S-2: ibid: Pl. 67:7. Late level VI (Stratum 3): Yadin/ Geva 1986: Fig. 11:8. Upper level V (Stratum 1) Yadin/ Geva 1986: Fig.7:4. Vessels analyzed by Panitz-Cohen 2009 are of types CP70a and 70b. **Tel Amal,** Level IV: Levy/ Edelstein 1972: Fig.10: 2–3. **Tel Rehov,** Stratum D-4: Mazar et.al 2005: Fig. 13.7:9. Stratum D-3: ibid: 13.9:7. Stratum C-2: ibid: Fig. 13.18:12. **Pella**, Phase IA: Smith/ Potts 1992: Pl. 51:5. Stratum 8: ibid: Pl.64:6. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig.335: 5, 6; 337: 1, 4, 6. Phase X: ibid: 3–5. Kiln in Trench X: ibid: Fig.73.8. **Tell el-Hammah**, area A, floors: Cahill 2006: Fig. 4:5, 7. **Tell Deir ᶜAlla,** LB Sanctuary, Phase B: Franken 1992: Fig.7-7:34. Phase F: ibid: Fig.7-21:47. Iron Age habitation, Phase A: Franken 1969: Fig.46:2, 4. Phase B: ibid: Fig. 49:7. Phase D: ibid: Fig. 56: 38 – 39. Phase E: ibid: Fig. 59: 5–8, 10, 13, 18, 20. Phase F: ibid: Fig. 61:35, 37 – 39, 41. Phase G: ibid: Fig. 63: 61, 65–67. Phase H: ibid: Fig. 66: 32.Phase J: ibid: Fig. 69:35. Vessels are mainly of IA type 1 (ibid: 120–127). **Tell es-Saᶜidiyeh,** Stratum VII: Pritchard 1985: Fig.3:33. Stratum VI: ibid: 6:23.

Jezreel Valley: **Megiddo,** Stratum VIIA: Arie 2013a: Fig.12.61:3; 12.64: 4–5; 12.68: 1–3. Stratum VIB: Arie 2006: 13.51:7–8; Arie 2013a: Fig.12.73:7. Stratum VIA: ibid: Fig.12.77:10–11; 12.91:9, 11; Arie 2006: Figs. 13.53: 5–6; 13.56:3; 13.58:3; Finkelstein/ Zimhoni/ Kafri 2000: Fig.11.2:9. Stratum VB: Arie 2013b: 693–694, Fig.13.31:8; 13.32:1; 13.35:12–13; 13.36: 1–3; 13.39:6–7, 11–

12; 13.43:9; 13.44:12–14. Stratum VA–IVB (L-3, H-5): Finkelstein 2006: Fig. 15.6:14. **Yoqneᶜam,** Stratum XIX: Zarzecki-Peleg 2005: Fig.I.5:19. Stratum XVII: ibid: Fig. I.9: 10; I.13:13; I.20:10, 14, 17; I.21:1. Stratum XVI: ibid: Fig. I.36:26–28. Stratum XV: ibid: Figs.I.57: 6, 31; I.65:15. Stratum XIV: ibid: Fig.I.40:24; I.43:3; I.46:17–20; I.58:29; I.60:9; I.63:15. Vessels are mainly of types CPII and CPV (Zarzecki-Peleg/ Cohen-Anidjar/ Ben-Tor 2005: 272–277. **Tel Qiri,** Stratum IX: Ben-Tor/ Portugali 1987: Fig.20:4. Stratum VIII/IX: ibid: Fig. 29:10. Stratum VIII: ibid: Figs. 16:7–8; 28:7. Stratum VII: ibid: Fig. 11:8–9. **Ta'anach,** Period IB: Rast 1978: Fig. 17:11–12. Period IIA: ibid: Figs. 23:9; 29: 1–2.

Central Hill Country: **Tell el-Farah (N),** Level VIIa: Chambon 1984: Pl.52:1. **Shiloh,** Stratum V: Bunimowitz/ Finkelstein 1993: Fig. 6.52:14; 6.57:12.

Phoenician Coast: **Tell Keisan**, Level 11: Briend 1980: 206, Pl.81:8a. Level 9c: Puech 1980: Pl.77:1a, d; 2d. Level 9a-b: Briend 1980: 210, Pl. 63: 2-2a, 4a, 5, 9a. Level 8: ibid: Pl. 55:3, 3a-e. Level 7: ibid: Pl.52:13, 13b-c. **Dor**, Irb horizon: Gilboa/ Sharon 2003: Fig.8: 1–3, 7 (vessels of types CP07 and CP08).

Philistine Coast: **Tell Qasile,** CP1 Stratum XI: Mazar 1985:52–53: Figs. 23:11, 13; 25:14; 27:20. Stratum IX: ibid: Fig. 53:17. **ᶜIzbet Sartah,** Stratum III: Finkelstein 1986: Figs.10:5; 12:15. Stratum II: ibid. Figs.16:6; 17:5. Stratum I: ibid: Fig. 24:14. Parallels are of type 12. **Tell es-Safi,** Phase A5: Zukerman 2012: 287, Pl. 13.6:8–9; 13.11:7. Parallels are of type CP302.1.

CP03 Cooking Pots with Restricted Opening and Grooved Rim

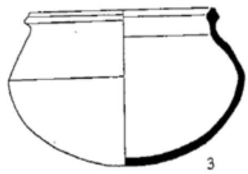


Fig. 5.61 CP03 9375/1

This type has a thick, modelled rim, restricted mouth, and globular body. Similar vessels are typical for Iron Age II contexts at many sites. The fragments from Iron I layers do not have handles, in contrast to the later vessels that usually have two handles from rim to shoulder. Only one of the vessels was restorable, and the absence of handles may be due to the fragmentary nature of the material. There are only six fragments and one whole vessel from the Main Iron I Horizon. The whole vessel derives from a stratified Iron I context (9375/1, on floor of from room 6132), found together with wide cooking pots, storage jars, and jugs. It has a 20 cm wide opening and is 26.5 cm wide at the shoulder and 16.5 cm high. Further examples derive from Iron Age II contexts at the site (Fritz 1990, see below), often with handles. At least some of the fragments from the Early Iron Age contexts might be intrusive. However, it is also possible that they, together with the restored vessel, show the appearance of this type already at the end of the Early Iron Age.

Distribution:
Main Iron I Horizon: 9375/1, 11099/1 (L 9918 with possible contamination between seasons), 12111/35; not illustrated rim-shards: 10532/4, 11156/6, 11864/6, 11873/1, 12569/1, 12572/3.
Post-destruction Phase: 4142/10.

Selected parallels: (from Iron I and early Iron II contexts)

Tel Kinrot, Stratum IV: Fritz 1990: Pls.85:10–11; 95:12. Stratum II: ibid: Pl.66:6; Pl.87:4–6; 91:10. Stratum I, ibid: Pl.64: 7–9, 11; 65: 1–2; 72:6–7; 73:3. Stratum II–I: ibid: 90, Pl.97:11; 98:6.

Jordan Rift Valley: **Hazor,** Stratum Xa: Ben-Ami 2012: Fig.2.7:18; 2.10:14. Stratum X: Yadin 1969: Pl. CCVII: 11, 13. Stratum IXb: Ben-Ami 2012: Fig.2.14:12, 2.15:21. Stratum IXa: ibid: Fig. 2.18:19, 2.19:4; 2.20:17. Stratum VIIIb: ibid 2012: Fig.3.2:10. Stratum VIIIa: ibid: Figs.3.5:5; 3.8:1; 3.10:14. Stratum VIIb: ibid: Figs. 3.12:15; 3.13:11. Stratum VIIa: ibid: 3.18:7–10, 16. Stratum VI: Yadin

1969: Pl. CLXXXIV: 9, 13; CCXIX:18; CCXLIX: 26, 28. Stratum V: ibid: Pl. CXC: 2–3. **Beth Shean,** Stratum P-8: Mazar 2006: Pl.24:14–15. Level IV: James 1966: Fig.69:21.**Tell Abu al-Kharaz**, Phase X: Fischer 2013: Fig. 101:9. Phase XI: ibid: Fig. 123: 4, 6. Phase XII: ibid: Figs. 83:6; 155: 4; 245: 10. Phase XIII: Fig. 176: 2–3.Phase XIV: ibid: Figs. 37:1; 42:7; 386:5.

Jezreel Valley: **Megiddo,** Stratum IVA (H-3): Finkelstein/ Zimhoni/ Kafri 2000: Fig.11.53:1. **Yoqneʿam,** Stratum XIV: Zarzecki-Peleg 2005: Fig.I.68:31. Stratum XIII: ibid: Fig.I.70:13, I.75:36. Stratum XII: ibid: Fig.I.82:46, I.84:20, 22; I.88:33, 37.

Phoenician Coast: **Tell Keisan,** Level 8: Briend 1980: Pl.55:8, 8a.

CP04 Cooking Jugs

Fig. 5.62 Cooking jug

One almost whole vessel and eight rim fragments have been classified as cooking jugs. They have a restricted opening (8–17 cm, and two wider vessels with a ca. 22 cm diameter of the opening). Both everted and upright rims occur. The rim form is simple and rounded or thickened, but not strongly modelled. Three fragments have a handle. In addition to the restored jug, six rim fragments derive from stratified Iron Age contexts. As most of the fragments are small, they can be considered intrusive and are not informative for the dating of their contexts. The only restorable cooking jug (10691/1) has one handle. It was found in a floor context of the earlier phase of the Main Iron I Horizon (U3B), in room 4301. The form does not differ from jugs, but I have classified these items as cooking jugs because of the ware, which is tempered strongly with quartz. They also have use wear typical for cooking pots: darkened color and blackened spots. Jug formed cooking vessels are rare in several Early Iron Age occupations in the region, e.g. Tel Beth Shean (Panitz-Cohen 2009: 230–231), and at Yoqneʿam, where the cooking jugs (or amphorae) have two handles (Zarzecki-Peleg 2005). At Megiddo, cooking jugs were rare in stratum VIB, but relatively numerous in strata VIA and VB (Arie 2006; 2013b), and at Hazor, the cooking jug appears first in stratum X, after the fairly small scale occupation during the Early Iron Age. It thus seems that the closed cooking pots become more popular during the Iron Age II. However, at Tel Hadar, Dan and Tel Abu al-Kharaz cooking jugs (with one or two handles) are common already during Iron Age I.

Cooking vessels relate to food preparation, and have therefore been considered as a possible ethnic marker (Barako 2013: 48–49; Yasur-Landau 2010: 9–30; Killebrew 1999). Panitz-Cohen (2009: 228–231) labeled the wide cooking pots “Canaanite,” and the closed cooking pots appeared as something else, indicating a different cuisine. However, it is far from easy to know if the difference is a chronological one, or whether it should be explained by different (ethnic?) groups having different ways of cooking and preferences for food. Closed cooking vessels appear during the Early Iron Age both in Egyptian and Philistine tradition, but these vessels have distinctive morphological features that deviate from the round-based cooking jug from Tel Kinrot: the Egyptian cooking jars have no handles, and they have tapering, or even pointed base; while the Aegean-style cooking jugs have a flat or ring base (Barako 2013: 45–49). However, the general form is similar enough to allow food preparation of a similar style.

<u>Distribution:</u>

Main Iron I Horizon: 10691/1, 12054/4 (with a handle), 12054/6, 12086/16.
Post-destruction Phase: 10411/2, 12104/15, 12085/28 (with a handle).
Later deposits: 10306/6, 10827/5 (with a handle).

Selected parallels: (from Iron I and early Iron II contexts)
Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pls.60:1, 8; 62:4. Stratum V: ibid: Pls.22:10; 24:7; 37:5; 38:5, 11. **Hazor,** Strata X–IX: Ben-Ami/Ben-Tor 2012: 424, Figs. 5.5:11–12. **Tel Zarᶜa**, Phase IV.3: Dijkstra/Dijkstra/Vriezen 2009: Fig. 4.5.15. **Beth Shean**, Late level VI and part of Lower V, S-3a/S-2: Panitz-Cohen 2009: 230–231, Pl.67:9; 68:3. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig.338: 1–6 (with two handles). Phase X: ibid: Fig. 368: 7.

Jezreel Valley: **Megiddo,** Stratum VIB: Arie 2006: 201–202, Fig. 13.51:10. Stratum VIA: ibid: Figs. 13.56:6; 13.59:7–10, 12; 13.66:9; 13.70:5; Arie 2013a: 500, Fig.12.74:6; Finkelstein 2006: Fig.15.1:5; Finkelstein/Zimhoni/Kafri 2000: Fig.11.2:11. Stratum VB: Arie 2013b: 696 – 697, Figs. 13.36: 7–8; 13.40:2; 13.49:5. Stratum VA–IVB: ibid: Fig. 13.50:7.

Central Hill Country: **Tell el-Farah (N),** Level VIIb: Chambon 1984: Pl. 53: 11–12. Level VIIe: ibid: Pl. 53: 14.

Phoenician Coast: **Tell Keisan**, Level 8: Briend 1980: Pl. 55:6. **Horbat Rosh Zayit**, Stratum IIa: Gal/Alexandre 2000: 42–43: Fig. III.79:26, III.89:14.

Baking Trays

There are few baking trays, made of a similar ware as the cooking pots and often having use wear as a result of constant heating and contact with fire. Because they were most likely used in food preparation, I have included them here with the cooking pots. Hunt noted the distinction between the baking trays of the Late Bronze Age and Early Iron Age. He suggested that they might have served for baking bread or for frying on an open fire (1987: 199).

BT01 Flat Cylinders with a Short Ring-base (LB type)

Baking trays of the Late Bronze Age tradition are formed of a shallow upright cylinder that is covered by a seemingly flat top (for drawings, see App. 5E). Five fragments were found in area H, from the constructional fill of the Foundation Phase. The “tray” has a concentric groove near the edge and irregular punctuations on the upper surface.

Distribution:
Stratum VII: 7010/1 (L3731).
Foundation Phase (Fill of): 6098/22, 6124/23, 6158/2, 6178/1, 6179/3, 9046/2.
Foundation Phase: 9386/1 (L6144).

BT02 Rounded, Shallow Baking Tray (IA type)


Fig. 5.63 Baking tray 10519/2

There are three examples of baking trays formed from one rounded, concave slab with irregular stick-punctuations on the outer surface and a rounded rim (6761/3, 4215/1). These examples represent the Iron Age I tradition (Hunt 1987: 199; Arie 2006: 218), which continues into Iron Age II (Ben-Ami et al. 2012: 457) and seems to appear already in the Late Bronze Age at some sites (Ben-Ami & Livneh 2005: 280). At Tel Kinrot they derive from the Early Iron Age layers and from a natural fill below the surface. They are also rare at other sites.

The best preserved tray 6761/3 is 26 cm wide and 6 cm high, and the large fragment 10519/2 also indicates a rounded, shallow form and a diameter of ca 20 cm. In tray 10519/2, there are no grooves or holes typical for baking trays. However, there are parallels that have typical dots only at the center of the tray, and their absence in the fragment may therefore be incidental.

Distribution:
Main Iron I Horizon: 6761/3, 10519/2
Natural fill below the surface: 4251/1.

Parallels:
Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pl. 56: 12, 14. Stratum V: ibid: Pl. 40:3; 32:4 (=Biran 1994: Fig. 98:6). Stratum IVB: Ilan 1999: Pl. 8:9; 9:6. **Hazor**, LBI Cistern 7021: Yadin 1958: Pl. CXLII: 9–11. Stratum 2: Yadin 1969: Pl. CCLXVII: 9. Stratum 1B: Yadin 1960: Pl. CXXIII: 13–14. Stratum 1A: ibid: Pl. CXXIV: 22; Yadin 1969: Pl. CCLXXXI: 17–18; CCXCV: 19–20. Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Fig.1.1:7. Stratum X: Ben-Ami 2012: Fig.2.1:20. Stratum IX: Yadin 1960: Pl. LII: 26. Stratum IXA: Yadin 1969: Pl. CLXXIX: 20–22. Stratum X–IX: ibid: Pl. CCXI: 16. **Tel Bet Shean**, Late Level VII: James/McGovern 1993: Fig. 8:11 (?).

Jezreel Valley: **Megiddo,** Stratum VIA: Arie 2013a: 527, Figs. 12.91:12; 12.95:2; Arie 2006: 218, Figs. 13.57:8; 62:10; Loud 1948: Pl. 85:11. **Tel Qiri,** Strata IX–VII: Hunt 1987: 199, Fig. 41: 10–11, 13–14. Stratum VII: Ben-Tor/Portugali 1987: Fig.13:3. **Yoqneʿam**, Stratum XVII: Zarzecki-Peleg 2005: Fig.I.21: 12–13. Stratum XIV: ibid: Fig. I.40: 27.

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Fig.6.47:6.

Phoenician Coast: **Tell Keisan**, Level 9a: Briend 1980: 211; Pl.63:3. Level 9c: Puech 1980: 222, Pl.77:6.

Philistine Coast: **Tel Qasile,** Stratum XI: Mazar 1985: 79, Fig. 26:20. Stratum IX: ibid: Fig. 54:24. **Timnah**, Stratum V: Panitz-Cohen/Mazar 2006: 73; Fig.72:16.

Cooking pots: Frequency tables

The following tables present the material from the areas of intensive retrieval, as the statistics derived from these contexts can be considered sound. The rim fragments not illustrated have been to a large extent excluded from the lists above, but they are included in the tables. Fragments of earlier cooking pot types occurring in the Iron Age layers appear in the tables as a combined group (MB–LB types or CP-mb). These fragments were small shards, residual to their contexts.

Type	Stratum							Total
	0	1	2	U3A/W3	U3B/W4	U4	U5	
MB–LB I-types	3	3	2	4	3	2	3	20
CP01 everted rim part	23	4	7	13	10	0	0	57
CP02A inverted rim part	86	30	59	68	89	3	0	335
CP02B upright rim part	34	8	17	21	29	0	0	109
CP03 restricted opening	2	3	1	2	0	0	0	8
CP04 cooking jug	1	0	0	3	1	0	0	5
Total	149	48	86	111	132	5	3	534

Fig. 5.64 Table of cooking pot types according to the local strata in the intensively retrieved areas U/W of the KRP (n=534). The types considered as Middle Bronze Age and Late Bronze Age I have been grouped together.

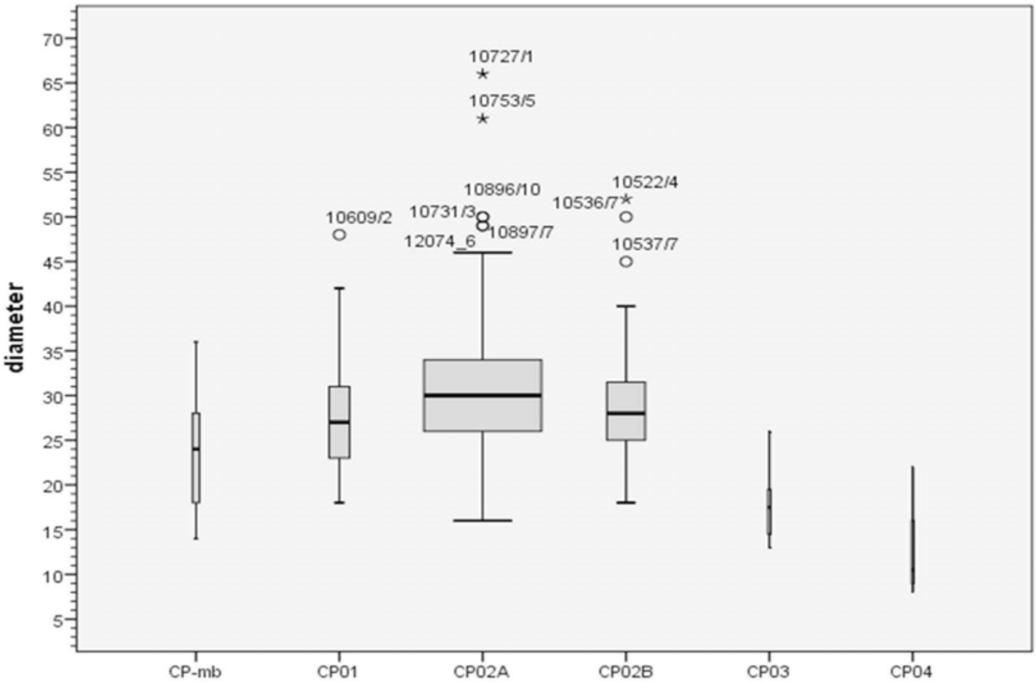


Fig. 5.65. Box-plot of the diameter of the cooking pot types. The width of the box reflects the amount of items.

Rim form	Cooking pot type						Total
	CP-mb	CP01	CP02A	CP02B	CP03	CP04	
missing/undefined (broken)	0	1	5	1	0	0	7
Rounded, simple or cut	10	1	1	0	0	1	13
Thickened, rounded lip	10	0	2	0	2	4	18
Thickened below lip, angular	0	0	1	3	1	0	5
Simple triangular	0	46	98	54	0	1	199
Grooved triangular	0	3	0	9	0	0	12
Thickened out below the lip	0	4	0	4	1	0	9
Pinched, round edged rim	0	0	21	2	0	0	23
Pinched, rounded upper part	0	0	62	5	0	0	67
Pinched, round edge and upper part	0	0	14	5	0	0	19
Rilled rim	0	0	0	0	4	0	4
Over-hanging	0	2	50	15	0	0	67
Over hanging, grooved	0	0	81	11	0	0	92
Total	20	57	335	109	8	6	535

Fig. 5.66 Distribution of recorded rim types according to the Cooking pot type. Rim types are illustrated in Appendix 2B.

Rim form	stratum							Total
	0	1	2	U3A/W3	U3B/W4	U4	U5	
missing/undefined (broken)	0	1	2	0	3	1	0	7
Rounded, simple or cut	2	2	1	3	2	0	2	12
Thickened, rounded lip	4	3	2	5	1	2	1	18
Thickened below lip, angular	1	1	1	1	1	0	0	5
Simple triangular	70	12	31	39	46	1	0	199
Grooved triangular	8	0	1	3	0	0	0	12
Thickened out below the lip	2	2	1	1	3	0	0	9
Pinched, round edged rim	9	1	6	4	3	0	0	23
Pinched, rounded upper part	16	7	9	14	20	1	0	67
Pinched, round edge and upper part	5	1	3	2	8	0	0	19
Rilled rim	1	1	1	1	0	0	0	4
Over-hanging	10	7	14	18	18	0	0	67
Over hanging, grooved	21	10	14	20	27	0	0	92
Total	149	48	86	111	132	5	3	534

Fig. 5.67 Distribution of recorded rim types according to the local phases

5.2.4 Storage vessels: Pithoi and Jars

Pithoi

A pithos (*πίθος*, pl. *πίθοι*) is a large container. It is set apart from storage jars by its size (ca 1 m high and 50 cm wide at shoulder), which is roughly 1.5 times as large as that of most jars. Pithoi have been the subject of intensive study. They have a wide chronological and geographic distribution in Israel-Palestine and the Mediterranean from the Middle Bronze Age to Iron Age II. During the Early Iron Age in Israel-Palestine, they are frequent in small rural sites on both sides of the river Jordan: in the central hill country in the west and the Madaba highlands in the east. At sites on the coast and in the valleys along trade routes they occur in smaller quantities, and this is also the case at Tel Kinrot, with its five whole or almost whole pithoi and twelve large fragments. Altogether 70 pithos rims and 15 body fragments derive from Iron Age settlement layers. Illustrations are included in Appendix 5E.

Pithoi have been considered as a vessel type requiring an especially high level of specialization on the part of the potters making them. The standardized form might result from specialized (itinerant) potters working with local raw materials (Herr 2007: 140), such as in Cyprus until the late 20th century (London1989a; 1989b: 221). The neck parts of the pithoi were formed on a wheel, but the lower part probably by coiling (Killebrew 2001). A technique combining coiling and a turn-table or wheel has been demonstrated in ethnographic studies of Cyprus (London 1989c: 42) and Crete (Killebrew 2001; Voyatzoglou 1974). The idea of itinerant potters producing pithoi has been opposed for Israel-Palestine because of the many different clay sources used for similar pithoi found at the same sites, and production in specialized workshops was suggested instead (Cohen-Weinberger & Wolff 2001: 654). In the sample studied from Megiddo, a minority of pithoi were made of local clays (Arie et al. 2006: 561–562). Killebrew suggested a combination of itinerant potters and local workshops (2001: 389). Local production was indicated for all vessels at Tel Yin'am with "relatively homogeneous style and petrography" (Folk & Liebowitz 2003: 237–238). In Dan and Shiloh there were pithoi of both local and non-local clays. The clay sources and morphological types have no strong correlation (Yellin & Gunneweg 1989; Cohen-Weinberger & Wolff 2001). The results achieved by neutron activation analysis indicate several regional centers of production for pithoi (Raban 2001: 503; Yellin & Gunneweg 1989: 139–140). Many production centers have been attested for pithoi in the coastal region as well (Cohen-Weinberger & Wolff 2001). The high level of specialization connected with manufacturing pithoi increased their value. Their value, as well as their large size, in turn affected the lifespan of these vessels. The pithoi were most likely used for a long time (Finkelstein 1988: 277; London 1989c: 44, Fig. 3). This longevity hampers the use of minor morphological details as chronologically significant factors.

The function of pithoi seems to have varied, from storage at small rural sites to trade containers at sites on trade routes; they also had a (secondary) use in burials (Ibrahim 1978: 122–123; Killebrew 2001, 389–390). Storage has been attested by remains of grain (Clark 2000: 78–79) and is generally considered their primary function. The idea of their use as trade containers has been objected to because of their large size (Esse 1992: 96; Cohen-Weinberger & Wolff

2001; Fischer 2013: 429). Fixed placements for pithoi have been found in storage rooms in domestic context in Iron Age (8th century BCE) in the Aegean island of Zagora (McLoughlin 2011: 929) In pre-modern Crete pithoi were the most common storage facility for agcultural goods, and the vessels were largely immovable. They were often even left *in situ* within the abandoned storage facilities (Schiffer 1987: 95; Christakis 1999: 5–6) However, use as a trade container in maritime and camel based trade has been proposed as their primary function in Late Bronze Age at Tel Nami (Artzy 1994: 121). A variety of functions have been reported for Cypriote pithoi in ethnographic studies (London 1989c: 43–44; 1989b: 221). The Cypriote pithoi have a wide opening, which enables more varied use than the closed shapes prevalent in Israel-Palestine and also at Tel Kinrot. Gloria London suggested that the difference in material culture of the highland versus lowland sites could be accounted for by different lifestyles she labeled rural and urban. The urban people needed fewer large containers and had less space for such (London 1989c: 43–44; 2000: 6). This probably explains in part the differences in distribution, but it includes a risk of circular reasoning if the rural nature is (partly) deduced from the simple pottery assemblages. The rarity of pithoi at the Early Iron Age villages of Qiri (Hunt 1987: 200), Qashish (Bonfil 2003: 292), and Hazor XII/XI contradicts the proposal of London. The link is stronger in geography.

The fortified highland village of Tall al-ʿUmayri revealed a considerable amount of pithoi (745 rims, 20 % of the assemblage), mostly from the casemate rooms. The architecture other than the fortifications consists of domestic structures (Herr 2000: 167, 172–175). High counts were reported for the fortified village of Giloh, at 33.7 % (Mazar 1981: 31–32), and at Shiloh 13 % of the shards and 40 % of the (almost) whole vessels (Bunimowitz & Finkelstein 1993: 153–154), and for Mt. Ebal 29–30 % of the shards (Zertal 1986–1987: 125, 134–136) and even 70 % of the whole vessels (Hawkins 2012: 54–56). The shares for pithoi at ʿIzbet Ṣarṭah are lower: 5 % in stratum III; and 1–2.5 % in strata II–I including the silos (Finkelstein 1986: 44–45). At Hazor, there were 58 published pithoi from the stratified Late Bronze Age II Lower City (ca. 4 %) and one vessel from the Upper City of the same period (less than 1 %). In stratum XII/XI, with the scattered, village-like remains of the Upper City, the amount of pithoi is 17 (ca. 6 %) – slightly more than their share in the urban Lower City in the LB. During the later urban Iron Age the pithoi disappear from the pottery assemblage at Hazor (Ben-Ami & Ben-Tor 2012: 424). However, the percentages are not representative due to the publication format. The share for pithoi from the Late Bronze Age levels at Tel Beth Shean is 1.3 % (Mullins 2007: 428) and during the Early Iron Age around 1–2 % (Panitz-Cohen 2009: Table 5.1). Counted from the whole vessels in the Tel Dan Iron Age assemblage (Ilan 1999: tables 3.3–5), the percentages fall between those of the hill country sites and those of the valley sites (stratum VI: 13 %; stratum V: 7 %; stratum IV: 1 %). Despite the high number of pithoi at Megiddo, they are not especially frequent in the assemblage as a whole (Esse 1992: 93; Arie 2013a: 520–522). The frequency in the Tel Kinrot Iron Age layers (counted from all Iron Age layers in areas of intensive retrieval) is 2.2 %, a figure in line with the sites in the valleys. The distribution hints at a function present both in rural and urban communities, but more prominent in the rural settlements in the hill country regions more distant from trading networks and urban centers.

Fragments of pithoi have been found in several areas at Tel Kinrot. Four restored examples derive from domestic areas K and S. Several larger fragments derive from the same contexts and from areas W (adjacent to area K) and G. The pithoi often come from the same context as storage jars, indicating a storage function. This phenomenon was noted already during the limited excavations of the Iron Age I remains in the 1980´s (Fritz 1990: 39, Pl.58: 3, 5), and such clustering has also been noted at Megiddo (Esse 1992: 88). Pithoi were not found from the city gate or any buildings identified as public. The proveniences indicate a household related function rather than an administrative or trade-related one. Double-pithos burials were discovered at Tel Kinrot during the salvage operations in the 1960's (Edelstein 1964: 11) and in the 1990's (Stepansky 2000: 10–11*, 16). In addition, a burial in area R included large pithos shards lying below and around the deceased adult and child. The pithoi from Tel Kinrot do not seem to differ from other vessels in regard to their ware. This implies a use of local raw materials, but a petrographic study is lacking. The descriptions of the ware from the vessels from the upper mound also recall the ware of the material from the slope (Fritz 1990: Pl. 58).

Most of the Tel Kinrot pithoi can be considered a northern variant of the collared pithos with a high neck (Aharoni 1957: 21–23; Golani & Yogev 1996: 51. There are a few pithoi rim fragments with wide mouths (12037/2, 12159/6, 10624/4) that could fit both the wide mouthed Galilean pithoi and the "wavy band" pithoi, but the identification of such small fragments is unsecure. There is considerable lack of clarity about the difference between the Galilean type with restricted opening and the Collared type (Gilboa 2001: 167; Frankel et al. 2001: 56–57), and some items considered Galilean pithoi actually appear to be a necked variant of the Collared pithos (as opposed to the neckless variant common in the southern and Jordanian hill countries), as noted by Braun for his sub-type B of Galilean pithoi (Braun 2015: 49–51). The Collared and Galilean types coexist at Tel Dan and at Tel Sasa (Biran 1989; Golani & Yogev 1996: 51). This probably was the case also at Tel Kinrot, even though all well preserved vessels can be defined as necked Collared pithoi. The presence of "wavy-band" ("Tyrian") type (Gilboa 2001) cannot be positively determined.

PT01 Collared Pithoi

Most of the pithoi from Tel Kinrot can be identified as collared pithoi. Collared pithoi (also called collared-rim jars) can be considered a hallmark of the Early Iron Age in Israel-Palestine. They were connected with the emergence of the Israelites in the region by Albright (1934, 1937), and many have since followed him more or less critically (e.g. Mazar 1981, Zertal 1986–1987, Finkelstein 1988, and Biran 1994, see Esse 1992 for an overview on the research history). The straightforward ethnic attribution of the collared pithoi with Israelites was already criticized in the late 1960's by Weippert (1971: 134), and has been largely abandoned since the 1980's, as the vessel type was also distributed on the eastern side of the Jordan, in regions never considered as being settled by the Israelites (Ibrahim 1978, Mazar 1981, Finkelstein 1988). It also became clear that the type emerges in the Israel-Palestine-Jordan region already during Late Bronze Age IIB (Salmon 2003: 26; Martin 2013: 386). The traditional name (with or without the "rim") has been understood as referring to the thick, folded rim (Callaway 1969:

8–9; Ilan 1999: 81), or to the ridge at the base of the neck (e.g. Mazar 1981: 27; Finkelstein 1988: 276; Killebrew 2001: 377; Herr 2007: 138). Mazar suggested a function for the ridge as strengthening the joint of the two parts (1981: 28), while Esse asserted a lack of function (1992: 96). The ridge at the joint appears also on the Galilean and the wavy-band pithoi (Biran 1989: Fig. 4.7:8; 4.12:6; Golani & Yogev 1996: 4–6; Ilan 1999: Pl.73; Killebrew 2001: 377).

According to the calculations of Avner Raban, a 110 cm high and 54 cm wide example had a capacity of 110-120 liters (Raban 2001, 494–495). When filled with liquids the weight would be well over 120 kg, and with solid products the weight would still easily exceed 70 kg. Two small handles are placed slightly below the shoulder. Most likely they were used for storage in a fixed place. The high level of standardization led Raban to suggest an administrative purpose for the pithoi (2001: 504), but it may also result from specialized professionals working in a routine way (Arnold 1985; Longacre 1999). It is also noteworthy that the size varies considerably both within sites and especially between them. At Tel Nami, the volume varied 10–30 % (Salmon 2002). The volumes recorded at Tall al ʿUmayri varied from between 120 and 150 liters, implying vessels with a content weight of 150–200 kg (Herr 2007: 140); at Sahab between 150 and 200 liters; and at Abu al-Kharaz 105 and 165 liters of capacity were measured for the two restored pithoi (Fischer 2013: 454). At Tall al ʿUmayri, collared pithoi unearthed contained carbonized barley seeds (Clark 2000: 78–79). Various foodstuffs, both liquid (oil, wine) and dry (e.g. cereals, dried fruit) were stored in pithoi in rural pre-industrial Crete (Christakis 1999: 4–7). It has also been suggested that they would have served primarily for storage of water (Zertal 1986–1987: 136). However, they have also been found in quantities at sites with abundant water supplies (Finkelstein 1988: 283).

Killebrew, following Kelso (1968) and Rast (1978), identified two types of collared pithoi using the neck height as the differentiating feature: group A with high necks (≥10 cm) and group B with short necks (below 10 cm; mainly 5–7.5 cm). Type B is more common, with a wide distribution and long life span from the end of the LB to the Iron II period (Killebrew 2001, 379–383). Most examples from Tel Kinrot lie on the border of these types, as the necks are 8–10 cm high. Thus they are high in comparison with the collared pithoi in the central hill country such as those from Giloh (Mazar 1981), Mt. Ebal (Zertal 1986: 129–136) or Shiloh V (Finkelstein & Bunimowitz 1993), or in the Madaba plains, such as those from Sahab (Ibrahim 1978: 117), or Umayri (Herr 2007: Fig. 5), or the pithoi from Megiddo (Arie 2006: Fig.13.65:8; Loud 1948: Fig 83: 1, 4), or the few items published from Tell Abu al-Kharaz (Fischer 2013: 436, Figs.174; 427). The neck parts from Tel Kinrot seem to be executed on the wheel, attested to by the fine wheel marks on the interior surface. The ridge appears at the point of the attachment of the neck and the shoulder.

Also, at Tel Kinrot the pithoi have rounded shoulders and an elongated oval body form with little variation (Fig. 5.68). The lower part tapers to its rounded, slightly pointed base. They are about 110–120 cm high, and the maximum width at the shoulder is about 50 cm. The walls are about 1 cm thick, and the rim part is thickened. The rim part is upright and the rim form is thickened outside. The diameter of the rim is 15–22 cm (mean: 17 cm). The rim part is 10–28 mm thick (mean at 20.4) and the neck 7–19 mm (mean: 12 mm). Many rims are folded over, sometimes leaving a thin hole in the middle. The finishing of the rim varies, creating many rim profiles without chronological significance, similar to many sites such as Giloh (Mazar 1981) or Tel Dan (Ilan 1999: 81) and noted more generally by Finkelstein (1988: 276–277).

Two well preserved vessels (8237/1, 8200/1) and several shards have rope marks on the body, most likely pressed into the body when it was bound to support the clay during drying. The marks are irregular, and may be interpreted as traces of the manufacturing process that the potter did not smooth off. Such binding techniques were observed in Cyprus, where the rope marks were removed while finishing the vessel (London 1989b: 222). Similar traces can be observed at vessels from many sites, and are often interpreted as non-decorative traces of production (e.g. Franken 1969: 162), but sometimes as decoration (Daviau: 1995: 611). The clay is strongly tempered with small to medium basalt grains (96 %). The secondary temper is usually chalk (83 %) and sometimes quartz (11 %), in lesser amounts and coarser particle sizes. When macroscopically evaluated, the method of tempering the clay seems more uniform than the tempering of other vessels at Tel Kinrot (except for the very uniform tempering pattern of the cooking pots).

PT01A Collared Pithoi with High Neck

The rim part is upright and the rim form thickened. The neck is rather high (7.5–12 cm), as is common for pithoi in the Galilee (Golani & Yogev 1996: 51; Aharoni 1957: Fig. 5:10–16). The shoulder part is rounded and the widest point of the vessel is at the upper quarter of the height. The upper part can thus be distinguished from the sloping shoulders of the Galilean pithoi (Golani & Yogev 1996: 49–51). The most common rim form is thickened on the exterior and seemingly formed by folding over, sometimes leaving the rim hollow. The finish has created a variety of minor differences in the rim form. There are rims that have a ridged rim profile throughout the chronological sequence (5180/1, 5132/1, 5140/1, 5155/1, 10506/4, 12080/1, 12178/1, 12098/3, 10237/5). All the ridged rim fragments have the typical "collar", and the rim form does not seem to have any chronological or geographic significance such as at several other sites (Mazar 1981: 27–29, Finkelstein 1988: 276; Ilan 1999: 81; Ben-Tor & Ben-Ami 2012: 23), nor does it correlate with the sharpness of the collar or rim thickness. The sharpness of the ridge varies from low and shallow (e.g. 5155/1, 14459/1) to pointed (e.g. 5132/1, 12178/1), and some have a double ridge (8173/1, 8200/1, 8237/1). The everted rim stance is exceptional at Tel Kinrot, with only two everted rims recorded (one is drawn: 10624/4).

Fig. 5.68 Collared pithos with high neck 14459/1

Everted rims are typical for the Collared pithoi at some southern sites, such as Giloh (Mazar 1981: Fig. 5–6, 13–15), Hesban (Ray 2001: Figs. 3.1: 1–4; 3.2:1–3, 5), and the earliest Iron Age level at Tall al-ʿUmayri (Herr 1997: 237; Clark 1997: Figs. 4.14, 4.16–20; Ray 2000: Fig.4.29: 1–6; Ray 2002: Fig. 4.10:7–12; 4.13:3–8; 4.14:1–9; 4:17–21, 23–26; Herr 2002: 140). The everted rim part occurs at the first Iron Age phase at Yoqne'am (Zarzecki-Peleg 2005: Fig. 1.3:22; 1.7:6) and in the levels VIII and VII at Tel Beth Shean (James & McGovern 1993: pls. 32:4; 44:1). It is possible that the upright neck and rim stance indicates some distance in time from the Late Bronze Age pithoi (Herr 2007: 138; Herr 2001: 246–247).

Distribution:
Foundation Phase: 5180/1.
Main Iron I Horizon: 5132/1, 5140/1, 5155/1, 8173/1, 8200/1 (?), 8237/1, 14220/2, 14459/1.
Main Iron I Horizon, earlier phase: 12098/3.
Main Iron I Horizon, later phase: 10506/4, 12080/1, 12081/1, 12178/1, 12071/4, 12124/1, 12159/6.
Post-destruction Phase: 10237/5 (with handle on rim, see below).

Parallels:
Tel Kinrot, Stratum V: Fritz 1990: Pl. 58:5 (the vessel has a pointed base).

Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pl. 46:4–6; 50:2; 53:6–7; 54:1–2; 55: 2–3, 6; 56: 6, 8; 57:3 (=Biran 1989: Figs. 4.12:5;4.16:8, 10; 4.18:6; 4.23:1–4). Stratum V: Ilan 1999: Pl. 26:3; 27: 1, 8–9, 11–13; 29:7; 30:5; 32:11; 33:9; 38:3; 39:8 (=Biran 1989: Figs. 4.1:2–6; 4.3). Stratum IVB: Ilan 1999: Pl.7:2. **Abel Beth Maacah**: Panitz-Cohen/Mullins 2013: photo from area F. **Tel Hadar,** Stratum IV: one whole vessel and a larger fragment (Kochavi/E. Yadin, pers. comm). **Hazor,** Stratum XII/XI: Yadin 1969: Pl. CLXVII: 8–9; CLXVIII: 20; Ben-Ami/Ben-Tor 2012: Fig. 1.2:15 (with a pointed base); 1.9:2. **Tel Yin'am,** Stratum XII: Liebowitz 2003: Fig.12:4; 14:9 (very similar to our 5140/1). **Tel Beth Shean**, Level VII (N-4): Panitz-Cohen 2009: Pl. 6:2. Lower Level VI (N-3b): Panitz-Cohen 2009: Pl.11:19; (S-3) 54:9; Late Level VI/parts of Lower level V (S-2): Panitz-Cohen 2009: Pl. 74:8. **Tell Deir ʿAlla**, N-slope phase E: Franken 1992: Fig. 5-16:26=van der Kooij 2006: Fig.16b. Phase A: Franken 1969: Fig. 47:2. Phase B: ibid: Fig. 50:100. **Tall al- ᶜUmayri**, Phase 13–12: Ray 1997: 4.19:8; 4.20:5; Ray 2000: Fig. 4.14:3. Late Iron I Temenos: Herr 2007: Fig. 5:6–8, 13–15. Unstratified: Herr 2001: Fig. 14.6:1. **Tell Hesban**, Stratum 17: Ray 2001: Fig. 3.7:1–2.

Upper Galilee: **Tel Sasa,** Stratum II: Golani/Yogev 1996: Fig. 6:4.Destuction Level L5: Stepansky/Segal/Carmi 1996: Fig.7:2. Post-destruction Phase: ibid: Fig. 8: 4–7 (rims only). **Ḥorbat ʿAvot**, Stratum 2: Braun 2015: Fig. 32: 9–10 (rims only).

Lower Galilee: Karmiel, Gal/Shalem/Hartal 2007: Fig. 10:7, 10 (rims only).

Jezreel Valley: **Megiddo,** Stratum VIA: Arie 2013: 521, Fig. 12.94:2–4. **Tel Qiri**, Stratum VIII: Ben-Tor/Portugali 1987: Figs. 17:4–5; 31:3; photo 39. Stratum VII: ibid: Fig. 13:4. **Taanach**, Period IA: Rast 1978: Fig. 4:1. Period IB: ibid: Fig.10: 1, 4. **Tel Qashish,** Stratum IV: Ben-Tor/Bonfil 2003: Fig.128: 5–6.

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Figs. 6.48: 1–2, 4; 6.51:4; 6.56:3. **Giloh,** Building 8: Mazar 1981: Fig.9:2–4. **ʿIzbet Ṣarṭah**, Stratum III: Finkelstein 1986: Figs. 8:10, 18; 9:3–4. Stratum II: ibid: Fig. 14:15. Stratum I: ibid: Fig. 23:18.

Phoenician Coast: **Tell Keisan,** Level 9c: Puech 1980: 216, Pl.:1, 2, 2a. **Tel Dor**?, IrIa(l) horizon: "many" and Ir1b horizon: "Present:" Gilboa/Sharon 2003: Table 5 notion for Collared rim pithoi. **Tell es-Safi**, Stratum A2: Avissar/Maier 2012: 372, Pl.15.45:5.

Collared pithos with high neck and handle on rim

Fig. 5.69 Collared pithos with high neck and handle on rim 10237/5

A peculiar exception to the normal placement of handles appears on a large pithos fragment 10237/5 (Fig. 5.69) with the handle running from the rim to the joining base of the neck, where a slight ridge lies. The handle has broken off, but its placement is clearly attested. Because handles are problematic to use for type definitions for fragmentary material, I wanted to refrain from creating a type for this item. This also seemed reasonable because in other respects it is in line with the high necked collared pithoi at the site. It has a high neck, a thick, ridged rim, rounded shoulder, and an estimated 20 cm wide rim circumference. There is ca. one third of the rim circumference preserved, and only one handle placement was preserved. Therefore, it seems that the pithos had two handles instead of four, which seems to be more common in the comparative material. However, in several cases the number of handles is conjectured. Münger has suggested that this feature shows an incorporation of the tradition of the central hill country Collared pithoi with the northern tradition of placing the handles of amphorae on rim (Münger 2005b: 87). However, closer connections may be seen between the pithoi and kraters, as well as wide mouthed storage jars (see below, jar SJ08). Kraters commonly have handles attached to the rim part, as for example on vessels from Tel Yin'am (Liebowitz 2003: 140, Figs. 4:8; 13:3). Handles from the rim to the upper part appear also on Late Bronze Age kraters from Tel Beth Shean (Mullins 2007: pls. 21:10, 58:4). It is also noteworthy, that the handles of the Galilean pithoi are often placed on the sloping shoulder, and thus higher than in Collared pithoi in general (Braun 2015: 28–31; 49–51).

Pithoi with handles on the rim are not common, but appear in several sites from contexts dated to the end of Late Bronze Age II to Iron Age I. Three pithoi fragments from Late Bronze Age Hazor have handles placed at the neck (Yadin 1958: Pls. CXIII: 18; CXV: 16; CXXX: 13). A very close parallel has been published from Megiddo stratum VIIA (Finkelstein & Zimhoni 2000: 242–243; Fig. 10.1:8; Arie 2013a: 523, Fig. 12.68:8; see also Loud 1948: Pl. 68: 5–6), and a smaller fragment already from VIIB (Martin 2013: 386–387, Fig. 10.13:12). A parallel from stratum VIA derives from room 5010, considered as a safe locus (Loud 1948: Pl.77:1; Finkelstein et al. 2000: 262; Fig. 11.17:6). Two pithoi with handles on the neck have been published from Taanach (Rast 1978: Figs. 10:4; 88:1), and one from Tall al-ʿUmayri (Clark 2002: Fig. 4.14:10). Closed kraters with ridged rims and similarly attached handles appear at Tel Beth Shean level VI early (N-3a; S-3a) (Panitz-Cohen 2009: Pl. 14:12; 62:1). One of these vessels was called a pithos (stratum 4: Yadin & Geva 1986: Fig. 33:3). At Tel Kinrot, there are wide mouthed jars with two or more handles placed at the rim (SJ08, see below). A tradition of pithos-krater and jar-krater combination is present in the northern Jordan rift valley. During the Late Iron Age this tradition also occurred in the south of Israel-Palestine (Avissar & Maier 2012: 372).

PT01B Collared Pithos with Short Neck

One pithos fragment, preserved from rim to shoulder, has a rounded, thick rim and a short neck 3.5–4 cm high; the rim is 10 cm wide. The shoulder is less than 40 cm wide. The size of the vessel seems to be that of large storage jars (see below, SJ08) rather than that of the pithoi, but the form with sloping shoulders, thick rim, and ridge at the base of the neck is that of a collared pithos. The very short neck and thick rounded rim recall the pithoi from the central hill country, such as those from Shiloh stratum V (Finkelstein & Bunimowitz 1993: Figs. 6.49:3; 6.51: 4, 6; 6.56:4) and Giloh (Mazar 1981: Fig. 9: 2, 4, 9), which have wider rims and upper parts, indicating a larger over-all size. It is noteworthy that the only small and short necked pithos derives from the Post-destruction Phase. At Tall al-ʿUmayri, there is a tendency for earlier pithoi to be larger than the later ones within the Iron Age I sequence (Herr 2007: 140–141). This trend may be a general one (Raban 2001: 495). The pithoi of Iron Age II that lack the neck (Daviau 1995: 608) may be considered as a later development from the short necked variant.

Distribution:
Post-destruction Phase: 4076/1.

Parallels:
Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pl. 52:2. **Tel Beth Shean**, Lower Level VI (S-3b): Panitz-Cohen 2009: Pl. 42:11.

Upper Galilee: **Tel Sasa,** Destruction level (L5): Stepansky/Segal/Carmi 1996: Fig.7:2.

Jezreel Valley: **Megiddo,** Stratum VIIA: Arie 2013: 521, Figs. 12.68:9, 12.71:1. Stratum VIA: ibid: Fig. 12.75:1–3; 12.87:5–6; 12.88:1–2; 12.94:1. **Taanach**, Period IIB: Rast 1978: Fig. 35:1.

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Figs. 6.51:6. **Giloh,** Building 8: Mazar 1981: Fig.9:9. ʿ**Izbet Ṣarṭah**, Stratum III: Finkelstein 1986: Fig. 13:22. Stratum II: ibid: Fig. 14:16.

Philistine Coast: **Qasile**, Stratum XI/X: Mazar 1985: 57. Stratum VIII: Maisler 1950–51: 199, Fig. 10c.

PT01C Pithoi with Inverted Rim and Sloping Shoulder

There are a few pithoi with a slightly inverted rim, which appear to have sloping shoulders and most of them lack a “collar” or ridge attaching the neck to the shoulder (such a ridge only appears on the most complete vessel 9591/1). Their rim parts are thick, and of the same width as the high necked collared pithoi. The absence of the ridge at the neck is probably a result of smoothing the surface after joining the neck to the body. These fragments always have a simple, thickened rim. The shoulder of the only items that are preserved far enough (8200/2; 9591/1) slope gently from the neck down. The sloping shoulder recalls the Galilean pithoi, discussed by Braun, especially his type A (2015: 48–53). However, none of the pithoi from Tel Kinrot have handles placed on the sloping shoulder. The pithos material from Tel Kinrot is too fragmentary to identify these fragments with any certainty as of the Galilean type.

Distribution:
Foundation Phase: 6480/4.
Main Iron I Horizon: 8177/1, 8200/2, 8544/1, 9591/1.

Parallels:
Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: Pl. 49:8. **Hazor,** Stratum XII/XI: Yadin 1969: Pl. CLXVII: 1–7.

Upper Galilee: **Ḥorbat ʿAvot**, Stratum 2: Braun 2015: Fig. 31: 5 – 6.

P01A-C Pithos shards of no closer definition

A majority of the pithos fragments are rim or body shards with no neck part preserved. The rims are similar to the collared pithoi, and therefore these rims are here considered as belonging to the collared type (either PT01A or PT01B). The published material from Early Iron Age Hazor is also mainly rim fragments. As this type is less informative than those with better preserved profile, I decided to leave out the parallels. Therefore, the item from the earlier Tel Kinrot excavations is now included in the distribution list.

Distribution:
Tel Kinrot, Stratum VI: Fritz 1990: Pl.56:4.
Main Iron I Horizon: 6598/4 (?), 7263/6, 8544/1, 11753/2, 11, 12111/24.
Main Iron I Horizon, earlier phase: 10624/4, 12087/8 (L5427)
Main Iron I Horizon, later phase: 10541/4, 12071/4, 12037/2, 12111/24.

PT02: Everted Pithoi


Fig. 5.70 Everted Pithos 10307/1

There are five fragments that deviate from the collared pithoi described above, as they have an everted, thickened, and slightly grooved rim. These rim fragments are somewhat different from each other. Therefore, they do not form a uniform group, and the type also remains loosely bordered due to the fragmentary nature of the material. Two rims (11024/1 and 11095/4) are wider (31 and 30 cm) than the Collared pithos rims (which are around 20 cm in diameter). Three (6050/1, 10307/1, 12037/2) are narrower (20–22 cm) and thus of the same rim width as the Collared pithoi. However, the flaring rim form recalls the Galilean type as defined by Aharoni (1957), Biran (1989: 75), and more explicitly by Ilan as subtype 1 of the Galilean pithos (1999: 82–83). However, it is difficult to identify these everted rims of 20 cm in diameter as either Galilean or Collared types, or as any defined type. The problem of different usages of the term Galilean pithoi was noted by Gilboa (2001: 167, footnote 9), and the Galilean pithoi were divided into several sub-types by Braun (2015: 48–52). There is a certain proximity with the thick rims of the kraters KR01 at Tel Kinrot, a phenomenon also noted by Ilan for the Galilean pithoi and certain kraters at Tel Dan (Ilan 1999: 74, 82). The everted pithos rims from Tel Kinrot are actually close to Middle and Late Bronze Age pithoi from Tel Dan (Ben-Dov 2011), Tel Sasa (Golani & Yogev 1996), and Beth-Shean (Mullins 2007: page), but the fragmentary state of material precludes firm conclusions. Most the everted pithos rims may derive from earlier phases of occupation, especially the rim 6050/1, which was found in the fill of the Foundation Phase. The most extensive fragment 10307/1 has a clay body that is of markedly lighter colour than most Iron Age ceramics at the site. The only everted rim fragment that derives from a secure Iron Age context is the rim 11095/4, which derives from a burial (L9969) below an Early Iron Age floor, together with several large (pithos) body shards below and above the deceased. Another Iron Age I pithos burial was identified during salvage excavations in southern slope (Edelstein 1964).

Distribution:
Foundation Phase (fill of): 6050/1.
Main Iron I Horizon: 11095/4, 12037/2 (not illustrated).

Natural fill below the topsoil: 10307/1, 11024/1.

<u>Parallels:</u>
Upper Galilee: **Tel Sasa,** Stratum III: Golani/Yogev 1996: Fig. 3:3. Stratum II: ibid: Fig. 5:7. **Ḥorbat ʿAvot**, Stratum 2: Braun 2015: Fig.21:3 (number 2 in drawing).

Jordan Rift Valley: **Dan,** Stratum VIIA2: Ben-Dov 2011: Fig. 72:7. Stratum VI: Ilan 1999: 48:2; 50:1; 56:9; 61:2–4 (Biran 1989: Figs. 4.12:6; 4.16:9; 1994: Fig. 91). Stratum V: Ilan 1999: Pl. 1:8; 21:8; 30: 7; 33:4 (Biran 1989: 4.7:8–9). Stratum IVB: Ilan 1999: Pl. 6:8, 11; 14: 5. **Mt. Adir**, Stratum III. Ilan 1999: Fig.6.6:10. **Hazor,** Stratum 2 (Area Q, Phase II): Covello-Paran 2007: Fig.10:3. Stratum 1: Yadin 1958: Pl. CXXX: 3–4. Stratum 1B: Yadin 1958: LXXXVI: 15; Yadin 1960: Pl. CXXII: 5; CCXCVIII: 7. Stratum 1A: Yadin 1958: LXXXVIII: 11–14. Yadin 1960: CXLV: 1, 4. Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Fig. 1.2:6. **Tel Yin'am,** Stratum XII: Liebowitz 2003: Fig. 24:9. Stratum XIIA: ibid: Fig. 36: 6. **Tel Beth Shean**, Level XB (R4): Maier 2007: Pls. 6: 9; 12:8; 24:2. Level XA (R-3): ibid: 35:6 (of pithos type 23). Pre-Level IX (R2): Mullins 2007: Pl. 46:5. Level IXB (R-1b): ibid: Pl. 58:4 (of the type KR2 Necked carinated krater); 71:8 (pithos type 1d). Level VI (N-3b): Panitz-Cohen 2009: Pl. 16:13. Lower Level V: James 1966: Fig. 18:5. Pella, Phase Oa: Smith/Potts 1992: Pl. 67:1.**Um-ad-Dananir**, burial Cave 2A: McGovern 1986: Fig. 22:27. **Tall al- ᶜUmayri**, Integrated Phase 10: Herr 2000: Fig.3.12:19, 21.

Jezreel Valley: **Yoqneᶜam**, Stratum XVII: Zarzecki-Peleg 2005: Fig.I.25:19.

Pithos type	local-strata in U/W									Total
	U0	W0	U1	W1	U2	W2	U3A	W3	U3B	
PT00	12	5	0	2	1	4	6	2	5	37
PT01A collared pithoi	0	0	1	0	0	4	0	0	0	5
PT01C simple necked	1	0	0	2	0	0	0	0	0	3
PT02 Everted Pithos	1	0	0	0	0	1	0	0	0	2
Total	14	5	1	4	1	9	6	2	5	47

Fig. 5.71 Distribution of pithoi in the intensively retrieved areas of the KRP. The preservation of pithoi in area W was generally better than that in area U. There were 20 pithos fragments in area W (3.5 %) and 27 in area U (1.7 %).

Jars

This vessel group is one of the most common ones, with 475 items altogether recorded during the KRP excavations. In the areas of intensive retrieval there were 429 recorded jars, of which 366 were rims, making up 17 % of the material in each of these areas (U/W). The storage vessels tend to cluster with each other, and the share of the jars in each context reflects the functions of the excavated spaces. Accordingly, there are dramatic differences between contexts within the Megiddo assemblage that can be accorded to different functions for those spaces. While the Temple context 2048 has no storage vessels at all, the share of jars in two possibly palatial buildings 2071 and 3021 was 15–16 %, and the popularity of jars in the domestic structures courtyard building 00/K/10 and partly preserved building(s) in area F was 39–40 % of the assemblages (Arie 2006: 232–240; for area F see also Ilan et al. 2000: 97; Finkelstein et al. 2000: 245). There are also marked differences between the two Iron Age I strata at Yoqneʿam: Str. XVIII: 8 %; Str. XVII: 20%, and similar fluctuation within the Iron Age II strata XVI–XI (Zarzecki-Peleg et al. 2005: 235; 296). At Tel Beth Shean, the jars in the MB assemblage made up 20 % of the assemblage (Maier 2007: 245), while their share in the LB assemblage including a temple was only 3.5 % (Mullins 2007: 391), and their share in the Iron Age levels in areas N and S with both domestic and administrative architectures and streets varies between 19 and 37 % (Panitz-Cohen 2009: 197; for the contexts, see Killebrew & Mazar 2009: 41–44, 48; Mazar 2009: 82; Panitz-Cohen & Mazar 2009: 102, 162–166). In many reports, the shares of the different vessel classes are given for the assemblage as a whole. The frequency of jars (17 %) at Tel Kinrot is of similar size with many other urban as well as village-like settlements of Late Bronze Age II and Iron Age I, such as those reported from Tel Yin'am, (18 %, Liebowitz 2003: 133), Tell Abu-al Kharaz (17 % *including the pithoi*, Fischer 2006: 118), Karmiel (16 %, Gal et al. 2007: 125), Shiloh (17 % *excluding the pithoi*, Mazar 1981: 31), Giloh (Mazar 1981: 31), and slightly more than their share at Izbet Sartah strata III–I (11–14 %, Finkelstein 1986: 45). At Tel Kinrot, throughout the Early Iron Age habitation the share of jars varies between 13 and 19 % (within areas U/W).

There are three well defined main types (Oval jars SJ01, Carinated jars SJ02, and Amphorae SJ03) that include many well preserved vessels. In addition, two jar types (sack shaped SJ04 and wide necked SJ05) have been defined with mainly fragmentary material. Illustrations are included in Appendix 5G. The types include a few border-line cases. The picture is largely similar to the Iron Age levels at Tel Beth Shean (Panitz-Cohen 2009: 231). These mid-sized closed vessels can be interpreted in terms of storage and transport. Jars often occur in groups with other storage vessels. This is especially clear at Yoqne'am (Zarzecki-Peleg 2005: photos I.13–29). This is also the case at Tel Kinrot.

SJ01 Oval Jars

This is the most common jar type, with over 250 registered items, of which 39 can be described as well preserved, as over half of the body profile can be reconstructed. Approximately half of the jars are of the oval bodied type (see Figs. 5.84–86). I have divided the type into three subtypes according to rim form, size, and decoration. The body is oval, some vessels are more elongated (e.g. 7690/1), and some more rounded (e.g. 7314/1). The necks are relatively high, and the diameter of the opening is around 10 cm. The shoulder is rounded, and two round loop handles are placed at the shoulder. Even though I have labelled the type according to the body form, it needs to be acknowledged that for most of the vessels it remains an inference based on the co-occurrence of the rim forms and oval bodies of the well-preserved vessels.

SJ01A Oval Jars with Ridged Neck

Fig. 5.72 Oval Jar SJ01A 12819/1

The most common jar with 183 items at Tel Kinrot is the oval jar with a high neck and a ridged rim (Fig. 5.72). The rim is thickened on the lip and has another, ridged thickening below the lip. The rim part is usually upright, but slightly inside or outside turned rims occur as well. The height of these jars is around 48–58 cm, and is thus almost double the width (25–35 cm). The neck is usually 6–8 cm high. The mouth is 8–10 cm wide in diameter. The wall at the neck is thin, but gets thicker towards the base. Two handles are attached at the rounded shoulder above the mid-body. Some of these vessels have a ridge at the joining of the neck to the body (e.g. 12819/1). This slight ridge is a trace of the separate forming of the body and the neck, joined together. The joining could have been strengthened by an additional clay coil, as attested by the excess clay at the place of the joining.

The thickest part of the rim is the rounded lip, which is 6–15 mm thick, on average 9.8 mm, with most examples between 8–12 mm. The thinner part between the lip maximum and the lower thickening is between 4 and 10 mm thick, on average 6.4 mm. The lower thickening is only slightly thicker than that (on average 7.4 mm), but forms a clear ridge on the outer profile. The neck is only 3–8 mm thick (4.9 mm on average). Jars with thick rims also tend to have a relatively thick neck. There is a trend for the diameter of the rim to get slightly smaller in the later phase of the Main Iron I Horizon and Post-destruction Phase, compared with the earlier phases of the Iron Age.

The jars are usually light brown with reddish and yellowish shades (the most common colors are 7.5YR 7/4 and 5YR 7/4 of the MSCC). The color of the core is usually dark and greyish, indicating a low firing temperature. Tempering is uniform, with many small basalt inclusions as the most common particle (recognized in 84 % of the jars). Chalk in medium–large sized particles was another common additive (in 78 %). The type is common during the Iron I habitation (35–47 % of jars in the intensively retrieved areas). This type is also the most common jar type in the mixed layers of the surface and colluvium below it.

The type is common in the Early Iron Age levels in northern Israel, and is especially popular in the valleys at sites such as Dan, Hazor, Tel Beth Shean, and Megiddo, all with dozens of restorable oval jars (e.g. Yadin & Geva 1986 and parallels below) – though this impression is based on published literature and may reflect at least partially the emphasis of the research. This type is more common at large sites, while pithoi are often more common at small sites (see also Mullins 2007:427–428 for a similar picture for the Late Bronze Age). Only a few examples derive from the central hill country with a lot of pithoi, or from the coastal region, where jars with carinated shoulders are more common (e.g. Mazar 1985: 54–56). Most of the close parallels for the Tel Kinrot jars SJ01 are dated to the transition of the LB II–Iron I, such as Tell Abu al Kharaz Phase IV/2 (Fischer 2006), Tell Deir ʻAlla phases A to K, especially from phases C–E (Franken 1969: 163). The Tell Deir ʻAlla phases have been dated by C-14: the beginning of phase A has been dated to 1180 B.C. ± 60 and the end of Phase D to 1190 B.C. ± 50, indicating a short period of time for phases A-D; the latest C-14 date of phase J is 1050 B.C. ± 40 (Franken 1969: 245). From Tell Keisan there are two jars from level 9c and six from 9a-b (Briend & Humbert 1980).[14] At Yoqne'am the oval jar is especially popular in stratum XVII, and occurs in strata XVIII and XVI in smaller amounts (Zarzecki-Peleg et al. 2005: 300), and at Tel Qiri such jars are frequent in stratum IX and become less common in later strata (Hunt 1987: Type SJIc, 186–188).

Inclined and short ridged rims of the Iron II, such as those published from Tell es-Sa'idiyeh VII (Pritchard 1985) or ʻAfula (Gal & Covello-Paran 1996: Fig.27:15–16[15]), may be considered as a later development of this type, close to the few short and thick rims that I have labelled as short necked jars (SJ06). However, in many cases the differences between the rim forms are not very strong.

<u>Distribution:</u>
Foundation Phase: 5192/1, 6466/1, 6480/2, 6483/1, 7250/1, 7314/1, 7314/2.
Main Iron I Horizon: 5133/1, 6556/1, 6587/1, 6707/1, 7372/2, 7426/1, 7649/1, 7690/1, 7832/2, 8122/1, 8130/1, 8174/1, 8218/1, 8487/1, 8500/1, 8507/1, 8510/2, 8543/1, 8543/2, 8546/1, 9118/1, 9122/1, 9138/1, 9138/2, 10506/7, 11849/2, 11857/1, 14279/4 (L1779 in S).
Main Iron I Horizon, earlier Phase: 10410/2, 10511/5 (U3B), 11532/4, 11553/1, 11554/2, 11554/4, 11562/3 (R2-2b), 12155/1 (W3), 12819/1, 12760/1 (S-5).
Main Iron I Horizon later Phase: 10559/3, 10522/1 (U3A), 12072/1 (W2), 12111/14.
Post-destruction Phase: 4119/1, 4123/9, 10259/2 (L4207, U2), 10226/2 (L4219 U1).

<u>Parallels: SJ01A</u>
Tel Kinrot, Stratum VI: Fritz 1990: Pl.56:3. Stratum V: ibid: Pl. 58:1. Stratum IV (constructional fill of): ibid: Pl. 59:13 (with SJ01B from the same locus), [66:9, 10: the two rims are rather thick and short compared to the most rims of the type SJ01A and have later parallels at e.g. Hazor Stratum X: Ben Ami 2012: Fig.2.2:9]; 96:7 (with grooved rim, like 12072/1 cf. Münger 2005: 7).

Galilee: **Tel Sasa,** Destruction Level L11: Stepansky/Segal/Carmi 1996: 66–67, Fig. 6:4. **Turʿan**: Shalem/Gal 2000: Fig. 4:5–6.

Jordan Rift Valley: **Dan,** Stratum VIIA2: Ben-Dov 2011: Fig. 75:1. Stratum VIIA1: ibid: Fig. 137:3 (Type SJ03). Stratum VI: Ilan 1999: 86, Pl. 59:3. Stratum V: ibid: Pl. 26:6; 33:6. Stratum IVB: ibid: Pl. 2:4; 13:8. **Hazor,** Stratum XII/XI: Yadin 1969: Pls. CLXVIII:14–15, 17; CLXIX:1; (Stratum 6 in area A) Bonfil 1997: Fig. II.33: 19–20; Garfinkel 1997: Fig. III.20:13; Ben-Ami/Ben-Tor 2012: Figs. 1.1:21; 1.2:9; 1.9:7; 1.14:6, 9–15. Stratum X: Garfinkel 1997: Fig. III.21:23. Stratum Xb: Ben-Ami

[14] Tel Qarnei Hittin in Lower Galilee most likely has these as well, but the Iron Age is not yet published but only mentioned (Gal 1981).
[15] Moshe Dothan (1956) has identified remains from Iron I, but his article in ʻAtiqot 1 was not available for me.

2012: Fig.2.3:29. Stratum Xa: ibid: Fig. 2.13:5–6. Stratum IX: Yadin 1969: Pls. CCIX: 17; CCXIII:9; Ben-Ami 2012: 2.17:16. **Tel Hadar,** Stratum IV: several vessels: Kochavi 1998: 471, 475, Fig.4. Kochavi/E. Yadin, pers.comm. ʿ**Ein Gev,** Stratum V: Mazar/Biran/Dothan/Dunayevsky 1964: Fig. 4:17. **Tel Yin'am,** Stratum XIA: Liebowitz 1981: 87, Fig.7:1, 4. **Umm ad-Dananir,** Cave B3: McGovern 1986: Fig. 37:6; Khirbet: ibid: Fig.48:3. **Tel Beth Shean,** Level VII: McGovern 1993: Fig. 24:3; James 1966: Fig.28:3. Level VI: James 1966: Fig. 54: 6–7. Late Level VI–Lower V (Stratum 2): Yadin/Geva 1986: Fig. 9:11; (Stratum 3) Fig. 11:12. Lower Level VI (Stratum 4): Yadin/Geva 1986: Figs. 28: 1–3; 29:1–4; 30: 1–2; 31: 1–3; (S-4): Panitz-Cohen 2009: Pl. 34: 4–7; 37:11; (S-3b) 41: 7–8; (S-3a) 47:4; 50:2, 9–10; 62: 6–7; (S-3) 53:6; 54:1. Late Level VI: James 1966: Fig. 52:10; 53:12. Late Level VI/parts of Lower level V (S-2): Panitz-Cohen 2009: Pl. 69:13 (=Mazar 1993: Fig.14:9); 70:3; 74:6. Lower Level V: James 1966: Fig. 18:13. Corresponds to type SJ70 (Panitz-Cohen 2009: 233–234).**Tel** ʿ**Amal,** Niveau IV: Levy/Edelstein 1972: Fig. 8:4. **Tel Rehov**, Stratum V: Mazar /Bruins/Panitz-Cohen/van der Plicht 2005: Fig.13.25:6. Stratum IV: ibid: Fig. 13.37: 3–4. **Pella,** Phase IB: Smith/Potts 1992: Pl. 50:7–9. Phase IA: ibid: Pl. 52:13. Stratum 6: ibid: Pl. 66:3. **Tell Abu al Kharaz,** Phase IV/2: Fischer 2006: 118, Fig. 51:2. **Tell Deir** ʿ**Alla**, Phase A: Franken 1969: Fig. 46:77–79, 81–82. Phase B: ibid: Fig. 50: 106–107; 51:1–3, 11–14, 33. Phase C: ibid: 54:103, 106–109, 111–112. Phase D: ibid: Fig. 57: 27–32. Phase E: ibid: Fig. 60:1, 5–9, 13. Phase F: ibid: Fig. 62:9, 12, 16, 19. Phase G: ibid: Fig. 65: 9–12, 14–15. Phase H: ibid: Fig. 67: 50–51. Phase J: ibid: Fig. 70:19, 21. Phase K: ibid: Fig. 72:49–55. **Tall al- ᶜUmayri**, Integrated Phase 12: Clark 2000: Fig.4.29:7 (For he stratigraphic key, see Herr 2002: 13). Late Iron I Temenos: Herr 2007: 141, Fig. 6:3. **Tell Hesban**, Stratum 18: Ray 2001: Fig. 3.5:4. Stratum 17: ibid: Fig. 3.7:6.

Jezreel Valley: **Megiddo,** Stratum VIIB: Martin 2013: 378–379, Fig. 10:19:3. Stratum VIIA: ibid: Fig. 10.24:12; Arie 2013a: (type SJ1A) 517–518, Figs. 12.63:1–2, 12.70:7; Finkelstein/Zimhoni 2000: Fig. 10.3:7. Stratum VIB: Arie 2013a: Fig. 12.73:8; Finkelstein/Zimhoni/Kafri 2000: Fig. 11.8:3–4 (Loud 73: 6, 8). Stratum VIA: Arie 2013a: Figs. 12.74:7; 12.76:4; 12.80: 9–10; 12.81:2, 4, 7–9; 12.83:1; 12.84:3; 12.86:8; Arie 2006: 212, Figs. 13.54:5, 7; 13.57:1–2; 13.58:9; 13.60:11–12; 13.61:1–2; 13.64:1; 13.65:2–3; Finkelstein/Zimhoni/Kafri 2000: Fig.11.4: 1–3; 11.13:8; 11.16:5 (=Loud 1948: Figs. 76:3, 4). **Tel Qiri**, Stratum VIII: Ben-Tor/Portugali 1987: Figs. 17:6; 32:1. Stratum VII: ibid: Fig. 13:8. Stratum VI: ibid: Fig. 9:7. **Yoqne**ʿ**am,** Stratum XVIII: Zarzecki-Peleg 2005: Fig. I.1:13–15. XVIIIa: ibid: Fig.I.32:6. Stratum XVIIa: ibid: Fig. I.4:10–11. Stratum XVII: ibid: Fig. I.15:1–3; 16:2–3; I.22:1–11; 29:17–19; 30:1; 33:7; 34:15. Stratum XVI: ibid: Fig. I.37:1. Corresponds to the type SJ IA (Zarzecki-Peleg/Cohen-Anidjar /Ben-Tor 2005: 296–298).**Taanach**, Period IA: Rast 1978: Fig. 6:11. Period IB: ibid: Fig.10:5; 11:4–5, 7–11. Period IIA: ibid: Fig.25:4.

Central Hill Country: -.

Philistine Coast: ʿ**Izbet Ṣarṭah**, Stratum III: Finkelstein 1986: Figs.10:12; 13:15. Stratum II: ibid: Fig. 15:20.

Phoenician Coast: **Tell Keisan,** Level 9c: Puech 1980: 217, Pl. 69:2, 2a Level 9a–b: Briend 1980: 207, Pl. 58:1, 6–8. **Tel Dor**, Ir1a (*l*) horizon: Gilboa/Sharon 2003: Fig. 4:8. **Tyre,** Stratum XVI: Bikai1978: Pl. XLIX: 6.

SJ01B: Oval Jars with Thickened Rim.

These jars generally have an oval body form similar to the group SJ01A, but the rim was less modeled, without the distinctive ridge (Fig. 5.73). Most of the rims are simple or thickened on the exterior. The rim is most commonly upright and sometimes slightly everted (9576/1). The neck is rather high, but tends to be slightly shorter than in the type with ridged rim (SJ01A). These jars were clearly less common than those with ridged rims, and only five have been preserved with a whole or almost whole profile. Three of them (7374/1, 10129/1, 11553/1) are 22–28 cm wide at the mid body and 39–40 cm high. They thus tend to be smaller than the type SJ01A. However, the size varies: the whole jar 9576/1 is ca. 40 cm wide and 55 cm high – as large as the largest examples of the SJ01A. The jars of this type with everted rims resemble the storage jars of the Late Bronze Age. Several rims are upright, or even slightly inverted, making the borders of this type somewhat loosely defined.

In the areas of intensive retrieval at Tel Kinrot (N=41) there is a trend that the outside turned rim parts tend to come from the earlier phases of the Main Iron I Horizon (W3 and U3B). Compared with type SJ01A (oval jar with ridged neck), the mouths of oval jars with simple rims are generally wider, at least partially due to the larger amount of opening rim parts. The mouth width varies between 7 and 14 cm, with the mean at 10 cm. The mean in this type is not a very typical value, as most examples are either 8–9 cm (40 %) or 11–12 cm (32 %) wide at the rim. The rim part and the thickness below the rim tend to be thicker in the oval jars with simple, thickened rims than in the jars with ridged necks. The maximum thickness varies between 6.8 and 15.6 mm, with the mean at 10.5 mm, and the thickness of the neck varies between 2.8 and 8.7 mm (mean at 5.9 mm).


Fig. 5.73 Oval Jar with Thickened Rim 11553/1

The clay of the oval jars with simple rims (SJ01B) is most commonly tempered with small (or medium) basalt inclusions (observed in 80 %), and to a lesser extent with coarser particles of chalk (in 70 %) and quartz (27 %). Roughly half of the shards were strongly tempered (55 %). The variety of other minerals used in small amounts in the temper is larger than in the types with ridged rims (SJ01A and SJ04). The method of preparing the clay thus seems to be less uniform. The color in the core of this type is lighter than in the type SJ01A. This might reflect better firing. The surfaces tend to be reddish yellow.

The oval jar with simple, thickened rim is common in the northern Jordan Rift Valley and in the Jezreel Valley during the transition from the Late Bronze Age to Early Iron Age I. In the later strata, this type diminishes in popularity (Zarzecki-Peleg et al. 2005: 300; Hunt 1987: 187–188). The simple rimmed oval jar is less common in western Galilee, the central hill country, and at the coastal sites. At Dor, the parallels are *part of* type SJ3, which was described as prolific (Gilboa & Sharon 2003).

<u>Distribution</u>
Foundation Phase: 6527/1, 7374/1.
Main Iron I Horizon: 5149/1, 8777/1, 9576/1, 10129/1 (L9012, T2), 11553/1 (L6476).
Main Iron I Horizon, earlier phase: 10654/3 (L4312, U3b), 12111/6 (L5442, W4).
Main Iron I Horizon, later phase: 12097/2 (L5423, W2), 12139/6 (L5443, W2).

<u>Parallels: SJ01B</u>
Tel Kinrot, Stratum IV: Fritz 1990: Pl.59:12, Stratum II: ibid: Pl. 62:9, 88:1.

Jordan Rift Valley: **Dan,** Stratum VIII: Ben-Dov 2011: Fig. 68:12. Stratum VII: ibid: Fig. 95: 16; 135:13; 157:9. Stratum VI: Ilan 1999: Pl. 44:9; 45:7; 47:3; 48:7; 55:1, 4; 61:1. Stratum V: Ilan

1999: Pl. 21:3; 22:13; 29: 4; 39:10; 44:4, 9. Stratum IVB: Ilan 1999: Pl. 13:1. Parallels with type SJ4: Ilan 1999:86. **Tel Hadar,** Stratum IV: several vessels: Kochavi/E. Yadin, pers.comm. ʿ**Ein Gev,** Stratum V: Mazar/Biran/Dothan/Dunayevsky 1964: Fig. 8:2. **Hazor,** Stratum 1: Yadin 1958: Pls. CIX:1; CXXVIII: 10; Yadin 1960: Pl. CXXI:1; CXLIV: 2, 4. Stratum XII/XI: Yadin 1969: Pl. CLXIX: 2; CLXX:14; CCII: 9–10; Ben-Ami/Ben-Tor 2012: Figs. 1.1:22; 1.9:8–9; 1.14: 16. **Tel Yin'am,** Stratum XIIB: Liebowitz 2003: Fig. 5:2. Stratum XIIA: ibid: Fig. 45:5. Stratum XII: ibid: Figs. 18:1; 24:7. Stratum XIA: Liebowitz 1981: 87, Fig.7:2. **Tel Beth Shean,** Level VII: McGovern 1993: Fig. 10:13; 23:1, 3. Late Level VII (N-4): Panitz-Cohen 2009: Pl.4:1, 4; 5:1; 10: 10–11 (type SJ71). Lower Level VI (Stratum 4): Yadin/Geva 1986: Figs. 32: 1–2; (N-3b): ibid: Pls.11: 8–9; 13:5–7; 16:11; (S-5) 23:1; (S-4) 30:3; 34:1; (S-3b) 41:11; (S-3a) 50:5; 62:9; 67:11. Late Level VI: James 1966: Fig. 53:13, 20; 54:16; (S-2): Panitz-Cohen 2009: 69:14 (=Mazar 1993: Fig.14:8). Corresponds with type SJ71 (Panitz-Cohen 2009: 234–237). **Tel Rehov**, Stratum IV: Mazar/Bruins/Panitz-Cohen/van der Plicht 2005: Fig. 13.37: 6. **Pella,** Phase IA: Smith/Potts 1992: Pl. 52:16–17. Stratum 8–7: ibid: Pls.64:10; 65:9. **Tell Abu al Kharaz,** Phase VI–VIII: Fischer 2006: 118, Fig. 54:1, 3. **Tell es-Sa'idiyeh,** Tombs 101, 110 and 141 of the earlier period: Pritchard 1980: Figs. 3:2; 15:6; 41:4. Tomb 109 of the intermediate period: ibid: Fig. 12:4. **Tell Deir ʿAlla**, LB Sanctuary Phase E9: Franken 1992: Fig. 5-11:20–21.Phase E10: ibid: Fig. 5-15:24–25. Iron Age settlement Phase A: Franken 1969: Fig. 46: 73, 84. Phase B: ibid: 20–21. Phase C: ibid: 54:121–122. Phase D: ibid: Fig. 57: 35–36. Phase E: ibid: Fig. 60:18. Phase F: ibid: Fig. 62:17. Phase J: ibid: Fig. 70: 38. **Tall al- ʿUmayri**, Late Iron I Temenos: Herr 2007: 141, Fig. 6:4.

Jezreel Valley: **Megiddo,** Stratum VIIB: Martin: 375–377, Fig.10.13:6, 9–10; 10.14:10; 10.19: 4–5; 10.22:8; 10.24:6, 8, 10. Stratum VIIA: Finkelstein/Zimhoni 2000: Fig.10.3:8. Stratum VIB: (type SJ1B) Arie 2013a: 518; Figs.12.61:5;12.68:4; 12.73:10. Stratum VIA: ibid: Fig. 12.82:1–7; 12.86:6; 12.87:3; Arie 2006: 213 (type SJ1b), Figs. 13.55: 1–2; 13.57:3; 13.61: 3–6; Finkelstein 2006: Fig. 15.2:2–3. **Tel Qiri**, Stratum VIII: Ben-Tor/Portugali 1987: Figs. 31:2; type SJI/b: Hunt 1987. **Yoqneʿam,** Stratum XIXa: Ben-Ami 2005: 185, Figs. III.20:17, 19. Stratum XVIII: Zarzecki-Peleg 2005: Fig. I.6:23. Stratum XVII: ibid: Fig.I.2:6; 16:4.26:1–2; 30:3. Stratum XVIIa: ibid: Fig. I.4:12. Stratum XVI: ibid: Fig. I.37:3 Corresponds to the type SJ IB (Zarzecki-Peleg/Cohen-Anidjar /Ben-Tor 2005: 298–300). **Taanach**, Period IA: Rast 1978: Fig. 6:18–10. Period IB: ibid: Fig.11:3, 12; 15:6–9. Period IIA: ibid: Fig.19:4; 20:2–3; 22:2–3; 25:3.

Central Hill Country: **Tell el-Farah (N),** Level VII-: de Vaux 1952: Fig. 3:3. ʿ**Izbet Ṣarṭah**, Stratum III: Finkelstein 1986: Figs.10:11; 13:9. Stratum II: ibid: Fig.15:21.

Phoenician Coast: **Tell Keisan,** Level 9a–b: Briend 1980: 207, Pl.58:2, 5. **Tell Abu Hawam,** Stratum VB: Balensi/Herrera 1985: Fig.16:1. **Tel Dor**, Ir1a (*l*) horizon: Gilboa/ Sharon 2003: Fig. 4:6. **Tyre,** Stratum XVI: Bikai1978: Pl. XLIX: 3–5.

Philistine Coast: **Qasile**, Stratum XII: Mazar 1985: Fig. 15:2.

SJ01A-B Oval Jars without Rim

There are several large oval jar fragments that lack the rim part and are thus originally either SJ01A or SJ01B. It seems that at least some of these items have had their necks deliberately cut off, probably as a part of their re-use after breakage, a tradition attested also at Megiddo stratum VI (Arie 2006: 212–213) and Tel Beth Shean levels VI–V (Panitz-Cohen 2009: 232). Recycling and re-use of broken vessels is also well attested in ethnographic research on pottery (e.g. Silva 2008: 253). Similarly cut off jars were used in burials during the Middle and Late Bronze Ages, when the opening of the jars

Fig. 5.74 Oval jar without rim 12082/2

used in burials needed to be widened in order to place the body in. At Tel Kinrot, they were found in the same contexts as other jar types. Therefore, their use during the Early Iron Age at the site was clearly house-hold related. Their ware is also similar with other oval jars. Such jars present a problem for the rim-based system of recording and statistics. Also, their recognition during the field work is often more difficult, and subsequently this kind of jar may not be restored as easily as the jars with their rims preserved. At Tel Kinrot, there were 13 jars without rims that were restored. I became aware of this kind of "type" relatively late in the process of making the typology. At that point, I was not able to consistently check if the rims seemed to be cut off, or if their absence was due to incomplete retrieval and/or restoration.

Distribution:
Main Iron I Horizon: 7172/1, 7462/3, 9249/1, 9254/1, 9337/1, 9563, 10623/1, 10658/3 (U3B), 12082/2, 12094/2, 12823/1 (not illustrated), 12816/3, 12826/2 (not illustrated), 14406/2, not illustrated), 14454/1
Post-destruction Phase: 8871/1, 8871/2 (base only).

Parallels: SJ01A-B
Jordan Rift Valley: **Dan,** Stratum VIIIA: Ben-Dov: Fig.31:8 (infant burial jar). Stratum VII: Ben-Dov 2011: Fig. 72:4. Stratum VI: Ilan 1999: Pl. 45:8. Stratum V: ibid: Pl. 34:6. Stratum IVB: ibid: 4:2; 5:5. **Hazor**, Stratum 1B: Yadin 1960: CXXXVIII: 8; Yadin 1969: Pl. CCXCIII:5. Stratum XII: Yadin 1969: Pl. CCII: 7. **Tel Hadar,** Stratum IV: several vessels: Kochavi 1998: Fig.4. Kochavi/E. Yadin, pers.comm. **Tel Yin'am,** Stratum XIIB: Liebowitz 2003: Fig. 4:6; 5:4. Stratum XIIA: ibid: Figs. 37: 2–4; 44:7–8. Stratum XIA: Liebowitz 1981: Fig.7:3. **Tel Beth Shean**, Late Level VII (N-4): Panitz-Cohen 2009: Pl.4:2; 5:2. Level VI: James 1966: 49:1; Yadin/Geva (Stratum 4): Fig. 32:3; Panitz-Cohen 2009: (S-5) 23:11–12; (S-3a) 50: 3–4, 6; 68: 1–2; (S-3) 54:2–3. Late Level VI–Lower V (Stratum 3): Yadin/Geva 1986: Fig. 12; (S-2) Panitz-Cohen 2009: Pl. 69: 15–16; 71:20. Level IV: James 1966: Fig. 39:7. **Tell es-Sa'idiyeh,** Tombs 107 and 132 of the earlier period: Pritchard 1980: Figs.10:5; 34:1. Tomb 105 of the later period: ibid: Fig. 8:4.

Jezreel Valley: **Megiddo,** Stratum VIIA: Finkelstein/Zimhoni 2000: Fig.10.1:5. Stratum VIA: Finkelstein/ Zimhoni/Kafri 2000: Fig.11.4:5–7, 9–10; Arie 2006: Figs. 13.55:3–6; 13.57: 4–7; 13.61:7–9; 13.62: 1–8; 13.64:4; 13.65:6; 13.67:2–4, 6, 10; 13.68:7; 13.70:4. **Yoqneʿam,** Stratum XVII: Zarzecki-Peleg 2005: Fig. I.22:16.

SJ01C: Oval Jars with Painted Decoration

This small version of the oval jar is of the same size as the smaller well preserved items of the subtype SJ01B, with the width around 20–26 cm and the height estimated about 36–40 cm. However, none of the few examples have both rim and body preserved. The two most complete vessels (7836/3, 12177/5) lack the very rim. Two rim fragments with radial stripes and triangular rim (11056/7, 11068/1) cannot be connected with any jar body, and they may even derive from wide mouthed jugs. They have horizontal bands in black and red from shoulder to neck, and one or few red bands on the lower part of the body (Fig. 5.75). The necks are high, but both vessels lack the rim. Some fragments also have crossing stripes or stylized palm tree motif on handles (Fig. 5.76). Two rim shards have radial stripes on a triangular rim. This type is problematic

Fig. 5.75 Oval jar, decorated 12177/5

Fig. 5.76 Jar 12805/3

in the shard material, as it may often be that the rim part lacks the decoration. This type is therefore problematic in the statistics. However, it is important to note that the tradition of painted decoration rooted in the Late Bronze Age in one or two colors also extends to the storage jars, though in small numbers. The clay material is similar to that of the other oval jars.

Distribution:
Below Main Iron I Horizon in area R, probably of stratum VII: 11056/7 (L9899), 11068/1 (L9926).
Main Iron I Horizon: 7836/3, 12085/3, 12055/4, 12177/5, 12805/3 (L1718/1729).

Parallels:
Jordan Rift Valley: **Dan,** Stratum VII: Ben-Dov 2011: Fig. 72:3. Stratum VIIA1: ibid: Fig. 120:13. Stratum V: Ilan 1999: Pl. 30:3. Stratum IVB: ibid: Pl. 17:6; 20:2. **Hazor,** Stratum 1: Yadin 1958: Pls. LXXXVI: 8–9; CIX: 2–3, 5; CXXI: 6–7; CXXIX:1–4; Yadin 1960: Pl. CXLIII: 8, 12. Stratum 1B: Pl. CXXXIX:16. **Tel Beth Shean**, Level VIII: McGovern 1993: Figs. 18:2–3; 32:3; 35:4. Late Level VII (N-4): Panitz-Cohen 2009: Pl.3:5; 10:12 (type SJ71). Lower Level VI (N-3b): Panitz-Cohen 2009: Pl.13:8; (N-3): Pl.14:13; 15:5; (S-3b) 41:10; 45:7; (S-3a) 50:7. Late Level VI: James 1966: 49:3; 50:20; 51: 4, 13, 15; (upper Level VI) 52:9. Late Level VI–Lower V (Stratum 2): Yadin/Geva 1986: Fig. 9:9; (S-2) Panitz-Cohen 2009: Pl. 70:2. **Tell Deir ʿAlla**, Iron Age settlement, Phase A: Franken 1969: Fig. 46:69; 47:3, 5–8. Phase B: ibid: Fig. 50:92. . Phase G: ibid: Fig. 65:60.

Jezreel Valley: **Megiddo,** Stratum VIII: Finkelstein/Zimhoni 2000: Fig.10.4:13 8Loud 1948:Fig. 60:4). Stratum VIIA: Arie 2013a: 519, Figs. 12.61:6; 12.65:3; 12.68:6. Stratum VIB: Loud 1948: Pl. 73:10; Arie 2006: Fig 13.52:1. **Taanach**, Period IA: Rast 1978: Fig. 6:15.

Central Hill Country: **ʿIzbet Ṣarṭah**, Stratum III: Finkelstein 1986: Fig.13:10. Stratum II: ibid: Stratum I: ibid: 8.

Phoenician Coast: **Tell Keisan,** Level 9c: Puech 1980: 216, Pl. 69:4. **Tel Dor**, Ir1a(*l*) horizon: Gilboa/Sharon 2003: Fig. 4:7.

Philistine Coast: **Qasile**, Stratum XII: Mazar 1985: Fig. 17:2. Stratum X: ibid: Fig. 47:12.

SJ02A Carinated Jars with Elongated Body

This jar type has a pronounced, angular shoulder and an elongated, bullet shaped body (Fig. 5.77). The shoulder varies between almost horizontal (7454/1, 8429/1) to a slope of ca. 45 degrees (9649/1, 10658/2). They are 44–54 cm high and 25–30 cm wide at the shoulder, and thus smaller than the oval type with ridged rim (SJ01A). The shoulder is the widest point of the body, tapering towards the base. The base is rounded and either simple (6708/1, 9649/1, 10558/1) or has a knob, unpronounced (9266/1, 10658/2) or pronounced (8429/1). Two loop handles are placed at the shoulder. The neck is upright, short and thick, about 3–4 cm high and ca. 1 cm thick. The lip is thick and rounded. The opening is 8–10 cm wide. The uniformity of the diameter and thickness variables is remarkable. Over half of the shards have a maximum thickness between 10 and 11 mm, and a thickness below the rim between 7.7 and 10 mm. There are 20 items of this type altogether (16 illustrated), and seven have been preserved with a full profile.


Fig. 5.77 Carinated Jar 10658/2

The body form bears a resemblance to the so-called Canaanite commercial jar in the Late Bronze period in the Levant (e.g. Amiran 1969: 139–141; Göransson 2007: 14). Still, the differences are clear as well: the bases of the Canaanite jars are narrow and the rims are modeled (Killebrew 2007: 166–188). In general, the carinated, elongated jars increase in popularity during the Iron Age, but during the Early Iron Age habitation at Tel Kinrot they appear in small numbers from the Foundation Phase until the Post-destruction Phase. They are more numerous in the main phase, but this is due to the larger size of the assemblage during this phase. The so-called torpedo-jars, found at Tel Kinrot in area D and dated to Iron Age II, can be considered as a later development.

The clay body of the carinated jars is less heavily tempered than that of the other jars, and the clay body seemed slightly different. The tempering materials include small to medium sized mineral particles. Though basalt is common, it is used only in ca. 40 % of the jars. Chalk is the most common additive to the clay (observed in 53 %), while quartz is almost as common as basalt (observed in 33 %), and traces of organic temper are also present in three items. The shouldered jars have rather yellow hues while the oval jars are more reddish. The core is generally darker (because of the thicker walls). Petrographic analyses of this kind of jar from Yoqneʿam and ʿEin el-Hilu in the Jezreel Valley indicated that they were produced on the northern coastal plain (Arie 2013a: 520).

Also, according to their distribution, the carinated jar is at home in the northern coastal region. At Tel Qasile, this type is common in strata XI–IX. There are dozens of storage jars of this type (jar 1) in the catalogue: one whole jar and 50 shards from stratum XI, and up to 38 whole vessels and 98 shards from stratum X (Mazar 1985: 54, 152–160). The type is common at Tell Keisan levels 9–8 and at ʿIzbet Sartah, where it cons. tutes 35 % of the storage jar rims in stratum III and even more in strata II–I (Finkelstein 1986, 45). One jar from Sarepta (Pritchard 1975: fig 24:6) and one from Tel Qiri IX (Ben-Tor/Portugali 1987: Fig. 20:5) have thick walls, resembling our jar 12083/4. The carinated jar occurs in the Jezreel valley already in the Early Iron Age (Megiddo VI, Yoqneʿam XVII), but is there more characteristic to strata dated to Iron Age IIA (Zarzecki-Peleg et al. 2005: 299–300; Arie 2013b: 709–712).

Variation

The jar fragment 12083/4 (Fig. 5.78, App. 5F, lacking the rim part) has exceptionally thick walls (23 mm in the upper part). The body is only 22 cm wide and its full height would be around 40 cm. The vessel is broken at the shoulder, which seems to have had a sharp carination. The overall shape is therefore narrower than the other carinated jars. However, I decided to keep this exceptional vessel inside the elongated carinated jar type, as it did share the main characteristics of the type and I wished to avoid a type of one vessel. Thick walls may indicate some special use for this vessel, probably related to some industry. A somewhat similar narrow, carinated, and thick walled jar was published from Qasile stratum X

Fig. 5.78 Jar 12083/4

(Mazar 1985: 58; Fig. 47:11). A fairly similar thick walled and narrow jar was also published from Tel Dor, Ir1a(*l*) horizon (Gilboa & Sharon 2003: Fig. 4:9).

Distribution
Foundation Phase: 14053/1.
Main Iron I Horizon: 6708/1, 6763/1, 7454/1, 7849/1, 8216/1, 8429/1, 9266/1, 9649/1, 10035/1, 11071/3.
Main Iron I Horizon, earlier Phase: 10491/3, 10588/7, 10658/2, 12045/4.
Main Iron I Horizon later Phase: 12049/3.
Post-destruction Phase: 4074/1.

Parallels: SJ02A
Tel Kinrot, Stratum II: Fritz 1990: Pl.88:2. Stratum IA: Pl. 82:5. These jars are discussed with the more elongated torpedo-jars (Fritz 1990: 67; Hübner 1990: 75–76, 94).

Galilee: **Karmiel,** Gal/Shalem/Hartal 2007: Fig. 10: 1–6. **Horbat Rosh Zayit**, Stratum IIa: Gal/Alexandre 2000: Figs. III.87:1; 92:7.

Jordan Rift Valley: **Dan,** Stratum V: Ilan 1999: Pl. 24:1; 42:3. **Mt. Adir:** Stratum II: Ilan 1999: Fig. 6.5:10. **Hazor,** Stratum 1B: Yadin 1960: Pl. CXXI:5. Stratum IX: Yadin 1969: CCIX:16. Stratum VIII/VII: Yadin 1958: Pl. LX:9. **Tel Hadar,** Stratum IV: single vessel: Kochavi/E. Yadin, pers.comm. **Tel Yin'am,** Stratum XIIB: Liebowitz 2003: Fig. 5:3. **Tel Beth Shean**, Lower Level VI (Stratum 4): Yadin/Geva 1986: Fig.33:1; Panitz-Cohen 2009 (S-4): Pl. 34:10–11. Lower Level V: James 1966: Fig. 19:17 (=60:6). Corresponds to type SJ72 (Panitz-Cohen 2009: 238). **Tel Rehov**, Stratum IV: Mazar/Bruins/Panitz-Cohen/van der Plicht 2005: Fig. 13.37: 5.**Tell es-Sa'idiyeh,** Tomb 101 of the earlier period: Pritchard 1980: 9, Fig.3:1 (thick walls and coarse ware).

Jezreel Valley: **Megiddo,** Stratum VIA: Finkelstein/Zimhoni/Kafri 2000: Fig.11.3:12; Arie 2006: (type SJ3) 214–215, Figs. 13.62: 9; 13.65:7; 13.68:8; Arie 2013a: 519–520, Figs. 12.83: 6–7. Stratum VB (K-3): Finkelstein/Zimhoni/Kafri 2000: Fig.11.19:18; Arie 2013b: (some jars of type SJ31) 712, Figs. 13.37:15; 13.45:10. **Tel Qiri**, Stratum IX: Ben-Tor/Portugali 1987: Fig. 20:5. Stratum IV/V: ibid: Fig. 21:2. **Yoqneʿam,** Stratum XVII: Zarzecki-Peleg 2005: Figs.I.10: 3–5; 17:3; 27:6–7; 30: 4–6. Stratum XVI: ibid: Fig. I.37:4 Corresponds to the type SJ IIIA–B (Zarzecki-Peleg/ Cohen-Anidjar/Ben-Tor 2005: 303–304).

Central Hill Country: ʿ**Izbet Ṣarṭah**, Stratum III: Finkelstein 1986: Figs.10:10; 13:7. Stratum II: ibid: Figs.14:14; 19:20. Stratum I: ibid: Fig. 23:20, type SJ23 (Finkelstein 1986: 86–88).

Phoenician Coast: **Tell Keisan,** Level 9c: Puech 1980: 217, Pl. 67: 2a, 3, 4; 69:3. Levels 9a–b: Briend 207 (type C), Pl. 59:1–6. Level 9a: Pl. 60:1–6. Level 8: ibid: Pl. 54:4. **Tell Abu Hawam,** Stratum IV: Hamilton 1935: Fig. 13. [Stratum VB: Balensi/Herrera 1985: Fig.16:2]. **Tel Par**, Phase 10: Gal 2000: Fig. 16:17 (rim only). **Tel Dor**, Ir1a (*l*) horizon: Gilboa/Sharon 2003: Fig. 4: 1–2, [Ir 1b horizon: ibid: Fig. 8:10]. **Tyre,** Stratum XIII-1: Bikai1978: Pl. XXXV: 13 (later jars of Bikai's type 14 have shorter necks). **Sarepta**, Stratum G2: Anderson 1988: Pl. 26:1. Stratum F: ibid: Pl. 29:9.

Philistine Coast: **Qasile**, Stratum XI: Mazar 1985: Figs. 23:23; 26: 13–14; 30:4. Stratum X: ibid: Figs. 34:18; 41:2; 43:19–21; 48:5–8, 10–12.

SJ02B Carinated Jars with Bag Shaped Body

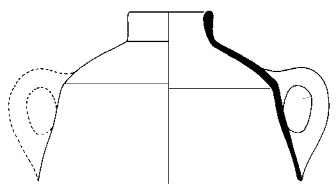


Fig. 5.79 Jar 8175/1

Two jars with a carinated shoulder have a body form that widens below the shoulder, indicating a widening, bag-shaped body. The jar 8175/1 (Fig. 5.79) has an upright, simple and rounded rim, like the Carinated jars SJ02A. The later item

(4032/1) has a sloping shoulder, very short neck, and a thickened rim (App. 5F). Similar shaped jars were considered as an offshoot of the elongated, carinated jars by Arie (2013b: 712). This kind of jar is common especially in Iron Age II, as well on the northern coastal plain at sites such as level 7 Tell Keisan (Briend & Humbert 1980: Pl. 50) and also more inland, such as at Ḥorbat Rosh Zayit stratum II (Gal & Alexandre 2000: 50, Fig. III.87:5, 7–8). The fragmentary nature of the jars precluded further analysis.

Distribution
Main Iron I Horizon: 8175/1.
Post-destruction Phase/Later Iron Age context: 4032/1

Parallels: SJ02B
Jordan Rift Valley: **Tel Beth Shean**, Lower Level VI (Stratum 4): Yadin/Geva 1986: Fig.33:2. Unstratified: James 1966: Fig. 72:7. **Tel Rehov**, Stratum IV: Mazar et al. 2005: Fig.13.37:5–6.

Galilee: **Horbat Rosh Zayit**, Stratum IIa: Gal/Alexandre 2000: Fig. III.87:5; 7–8; 92:9.

Jezreel Valley: **Yoqneʿam,** Stratum XIV: Zarzecki-Peleg 2005: Fig. I.44:8.

Phoenician Coast: **Tel Par**, Phase 7: Gal 2000: Fig. 17:14. **Tell Keisan**, Niveau 7: Briend 1980: 187, Pl. 50: 7.

SJ03 Amphora-jars


Fig. 5.80 Amphora 11075/12

The amphora (ἀμφορεύς) refers to a jar with two handles for carrying; the term in Greek sources is commonly used after 400 BC (Göransson 2007:9). Here I use the term for jars with two handles attached to the upper part (like Mazar 1985: 59–61). At Tel Kinrot, the amphora jars are smaller than the other storage jars (Fig. 5.80). They are 38–43 cm high and 21–28 cm wide. There are a few smaller amphorae (26–34 cm high and 19–21 cm wide). The body is globular or slightly biconical, the shoulder is slender, and the base rounded or tapering. The neck is 6–8 cm high and upright. The lip is simple, thickened, and often slightly turned in. Most of the thickened rims are thickened on the inside. The inside turned rim part is more common in the earlier phases of the Iron Age than in the later phase. Two vertical handles run from the rim to the joining of the neck to the body. The mouth is 6.5–12 cm wide, with most of the items being 8–11 cm wide (on average 9 cm). Most vessels would have had a capacity of 3.5–6 liters, with three larger vessels having a capacity of 9.5–12 liters, thus it may be that two size variations existed.[16] The calculations are based on 12 well preserved items.

The walls are relatively thin. The thickness at the neck is 3–9 mm (on average 5.4 mm), while the lip is 6–13 mm thick (on average 9.2 mm). The tempering of the amphorae (SJ03) is dominated by many medium-sized basalt particles (observed in 92 % of shards in areas U/W). Chalk is commonly present (66 %), but in small amounts, while the particle size tends to be medium

[16] The capacities are from Münger (2013: 157, 168–169), with a concise discussion on this vessel type. He suggested three size variations. However, the smallest capacity (1.2 liters) was based on a false scale and should be corrected to fit the main size category of over 3 liters.

or coarse (0.3 mm or more in diameter). Quartz is also quite often added (30 %). The color on the surfaces is generally brown and grey shades of red. The amphorae are thus darker than oval or carinated jars. The core is usually grey.

The amphorae are concentrated especially in the house complex in areas R and S, with several items from a few loci. This kind of a small amphora is very common at Tel Kinrot (altogether 57 items, 29 illustrated). There are also several vessels from Tell Hadar stratum IV, but otherwise the type is rare: its distribution is concentrated in the northern Jordan rift valley. A few comparable items derive from Tell el Ghassil in the Beqa'a valley (Joukowsky 1972) and from Tel Dan, but only one item from stratum VIIA–VI is morphologically very similar (Ilan 1999: Pl. 62:5). Some large jugs have a similar rim, but one handle only (Ilan 1999: Pl. 14:1; 53:3; 56:10), and three amphorae combine features of this amphora and the wide necked jar type with ridged rim (SJ04). One is from stratum VI, and two slipped items are from stratum IVB (Ilan 1999: Pls. 53:5; 3:6; 5:6). Ilan interpreted the appearance of amphorae at Tel Dan as a result of Aegean inspiration (Ilan 1999: 87; Furumark 1941: 595). Other sites of occurrence are ʿEn Gev and possibly Tel Dover (Münger 2012: 9–10 with references to less close parallels in the region now parts of Lebanon, Syria, and Turkey). The general form resembles a cooking amphora from Beth-Shean (Panitz-Cohen 2009: 230; Yadin & Geva 1986: 24, Fig. 9:8) and from Tel Dor, Ir1b horizon (Gilboa & Sharon 2003: Fig. 8:16), but the clay preparation of the amphorae at Kinneret differs from that of the cooking ware. The cooking jugs also tend to have shorter necks and everted rims (e.g. Arie 2006: 201–202). The large jug J3 from Megiddo VIA (Arie 2006: 204; Fig. 13.54:1; Finkelstein et al. 2000: Fig. 11.3:13) resembles our amphora SJ03 in its general form and proportions, but it only has one handle. A two-handled jug (Loud 1948: Pl.74:15) is from an unclear context.

<u>Distribution</u>
Foundation Phase: 7402/3, 10152/1 (L9020, T3).
Main Iron I Horizon: 6598/2, 6858/11, 7011/1, 7012/2, 7013/1, 7014/1, 7426/4, 7430/1, 8463/4, 8488/1, 9270/1, 9272/2, 9289/1, 9322/2, 9326/1 (?), 9351/1, 10128/1 (L9012, T2), 11317/1, 11327/1, 11573/1, 11075/12, 14048/4, 14409/1, 12618/1 (not illustrated), 12825/1, 12828/1.
Main Iron I Horizon, earlier Phase: 10584/1 (L4301), 12141/1, 12155/1 (L5447, W3).
Main Iron I Horizon later Phase: 12071/3 (5423, W2).
Post-destruction Phase: -

<u>Parallels: SJ03</u>
Jordan Rift Valley: **Dan,** Stratum VIIA–VI: Ilan 1999: Pl. 62:5. **Tel Hadar,** Stratum IV: several items: Kochavi 1998: 468, Fig.4; Kochavi/E. Yadin, pers.comm. **Tell Zar'a** Phase IV.2: Dijkstra/Dijkstra/Vriezen 2009: Fig. 4.6:5. **Tel ʿAmal**, Level III: Levy/Edelstein 1972: Fig.10:9. **Tell Abu al-Kharaz**, Phase XI: Fischer 2013: Fig. 107:1. (Continuing as *Beqa'a valley in the Lebanon)* **Tell el-Ghassil**, area III, Level 4: Joukowsky 1972: Pl. XXVI: 27. Level 10: ibid: Pl. XXX: 31.

Syrian inland: **Hama,** Period G VII: Riis 1948: 56, Fig. 48.

Philistine Coast: **Qasile,** Stratum XI: Mazar 1985: 30:12 with painted bands.

SJ04A Wide Necked Amphora-Jar

Fig. 5.81 Wide Necked Jar 10651/1

This jar type has a strongly modeled rim and two or more handles running from rim to neck. The neck is generally wide, and probably the over-all size is relatively large as well. Two Wide Necked jars could be restored. The jar 10651/1 (Fig. 5.81, from local stratum U3A) has an oval body and a ring base. It is 52 cm high and the width at the widest point is 35 cm. This example is very similar to a pithos-krater published from a LBII context at Tel Yin'am (Liebowitz 2003: 140, Fig.13:3). The other restored jar lacks the base. The body is oval, and the vessel would be slightly over 60 cm high, with a maximum width of 45 cm. These jars therefore seem to be slightly larger than other jar types, but still clearly smaller than the pithoi. However, there is some closeness in form with the pithos fragment 10237/5, with a handle on the rim. The sloping direction of the shoulders is similar to the oval shaped jars (SJ01) and the amphorae (SJ03), and this also indicates that the body form would be rounded or oval.

The diameter of the opening varies between 11 and 20 cm, on average 13.9 cm. The rim is thickened and usually has a strong ridge below the thickened lip. The rim part is upright. The rim and walls are thicker than in the other jars at all measured points. The maximum thickness of the rim varies between 7.6 mm and 15.8 mm with the mean at 12.3 mm; the minimum is from 4.9 to 10.4 mm with the mean at 7.9 mm; the lower thickening varies between 5 and 12 mm with the mean at 9.3 mm, and the wall thickness of the neck varies between 4.2 and 9.7 mm with the mean at 6.7 mm. The the body form is indicated by the gentle and rounded form of the shoulders and two well preserved vessels. The difference between this type and oval jars with ridged rim (SJ01A) is somewhat problematic for the shard material where the handles are missing. Indeed, there are a few border-line cases: three rim fragments have a mouth only 8.5–10 cm wide, but have loop handles attached to the rim (10947/1 and two rim shards not illustrated). In addition, there are three simple rimmed shards (5139/1 and two fragments not illustrated) with handles attached to the rim, therefore considered as belonging to this type.

The tempering of the clay is dominated by many small to medium sized basalt particles (recorded as main temper in 89 %). A smaller amount of medium-sized or coarse chalk grits were almost always recorded as a secondary temper (95 %). The use of temper is very uniform. The color is reddish on the surfaces and dark grey in the core. The type is rather rare, concentrating in the northern Jordan Valley.

Distribution
Foundation Phase: 6530/1.
Main Iron I Horizon: 4815/4, 4828/1, 5139/1, 5148/1, 5156/1, 5361/1, 6598/2, 6667/2, 7687/7, 7785/1, 7838/1, 8701/2.
Main Iron I Horizon, earlier Phase: 10480/1, 10651/1 (three or four handles), 10947/1.
Main Iron I Horizon later Phase: 12071/5, 12073/2.
Surface: 5355/1

Parallels (SJ04A):
Kinneret, Stratum IV: Fritz 1990: Pl 58:2.

Jordan Rift Valley: **Tel Dan,** Stratum VI: Ilan 1999: amphora pl. 53:5 is of the form of our amphora SJ04 but smaller. Stratum IVB: Ilan 1999: Pl. 5:6. **Tell Zar'a** Phase IV.3: Dijkstra/Dijkstra/Vriezen 2009: Fig. 4.6:4. **Tel Beth Shean**, Level VI (Stratum 4): Yadin/Geva 1986: Fig. 33:3. **Tell Deir 'Alla,** phase B: Franken 1969: Fig. 51:26. **Pella,** Stratum 7: Smith/Potts 1992: Pl.65:8.

Jezreel Valley: **Megiddo**, Stratum VIA: Loud 1948: 77:1 (considered a pithos by Arie 2006: 217).

SJ04B Wide Small Amphora

One wide necked small amphora from the Main Iron I Horizon has handles placed on the shoulder: 8125/1. The vessel is 29 cm high and 26 cm wide, and thus of the same size as small amphora-jars. The mouth is 15 cm wide and two round loop handles are placed on the sloping shoulders. The rim is everted and the thick base stands on a shallow ring.

Fig. 5.82 Wide Small Amphora 8125/1

Parallels (SJ04B):
Jordan Rift Valley: **Hazor,** Stratum XV: Garfinkel 1997: Fig. III.16: 19–20 (smaller but of the same form). Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Fig.1.11:3. Stratum 1B: Yadin 1960: Pl. CXX: 20 (decorated, triangular rim). **Yin'am**, Stratum XIIA: Liebowitz 2003: Figs. 35:11–12; 39:2–3; 43:5 jugs with a handle on the shoulder. **Tel Beth Shean**, stratum VI: James 1966: Fig. 50:4. **Tell Deir ʿAlla**, Phase E7: Franken 1992: Fig. 5-4:16.Phase E8: ibid: Fig. 5-6:21–22; 5-7:24.

Philistine Coast: **Tell Qasile**, Stratum XI–X: Mazar 1985: Fig. 32:13. Stratum X: ibid: Fig. 47:15.

SJ05 Hole-mouth Jar

There is no neck on these jars. The opening is wide and the rim is thick. This group is heterogeneous. There are only three examples grouped together, and they all derive from area K phase 2 (Main Iron I Horizon). The jar 8517/1 is the only whole vessel, with two loop handles on shoulder. Rim fragment 8039/1 is strongly inverted and has a round shoulder. Thick rim fgragment 8463/5 seems to be uprigh. The fragmentary nature of the material precludes detailed discussion. This type seems to be at home in southern Israel-Palestine, and appears at most sites during Iron Age II. Most parallels are later and lack handles.

Parallels (SJ05):
Jordan Rift Valley: **Dan,** Stratum IVA: Biran 1994: Fig. 140. **Hazor,** Stratum VIII: Yadin 1958: Pl. LIX: 1. Stratum VIIb: Ben-Ami 2012: Fig. 3.13:10. **Tel Beth Shean**, Level VI (Strata P-7, P8): Mazar 2006: 354, Pls. 22:3; 25: 9–10; 38:3–5; 39:1–2. **Tell es-Sa'idiyeh,** Stratum VI: Pritchard 1985, Fig.9:1–4.

Jezreel valley: **Megiddo,** Jar Type 69: Stratum IV–II: Lamon/Shipton 1937: Pl. 13:69. **Yoqneam,** Stratum XII: Zarzecki-Peleg 2005: FigI.79:10. Stratum XIV–XII: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 307.

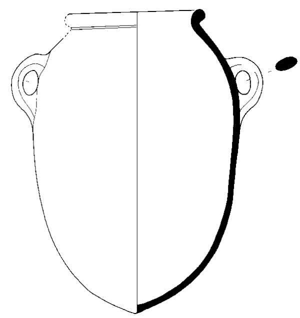


Fig. 5.83 Hole-mouth jar 8517/1

Southern hill country: **Tell Beit Mirsim**, Phase A: Albright 1932: Pl.52: 12 – 13. **Tell el-Far'ah (S)**: Amiran 1969: Pl.80:3.

Philistine Coast: **Tell es-Safi**, Stratum A3: Shai/Maier 2012: Pls. 14.5:7; 14.12:9 – 10; 14.14:13.

SJ06 Short Necked Jars

These jars have a short neck and a thickened, triangular rim. Few rim parts were found. The triangular rim is common in the cooking pots, and also present in the jugs. None of these examples was preserved including the body, thus leaving the size and actual body form open. The rim parts were exceptionally large to be considered as jugs. Due to the poor preservation, no parallels were searched for. Both rims derive from the Main Iron I Horizon: 6598/4, 8197/1.

SJ Undefined Jars

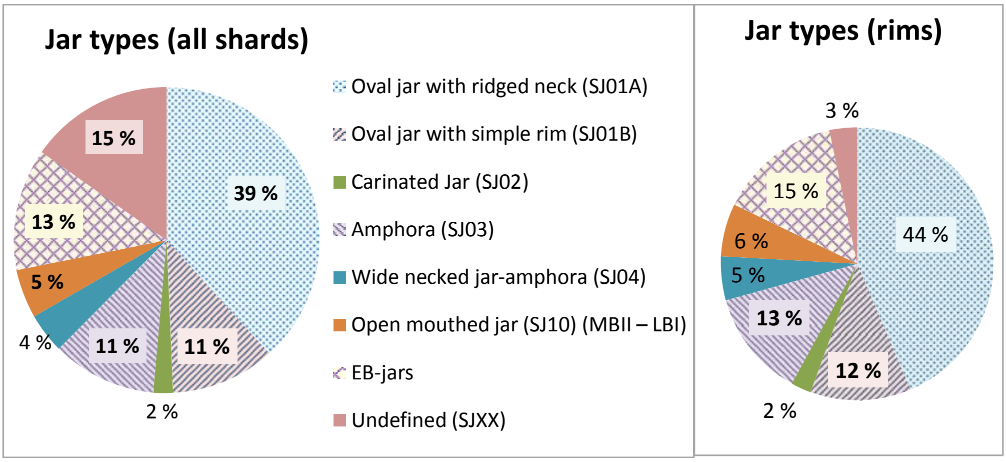
This group consists mainly of decorated body shards or handles with different incised marks, or finger or seal impressions. The size of these vessels appear to be that of jars rather than that of jugs. The decoration includes painted horizontal lines, crossing stripes, or (rarely) a net pattern. Two shards portray figurative presentations (6704/2, 6704/3). The motifs, however, remain obscure. These shards might also be of a krater. It may also be that most of these body fragments are from oval jars and could be classified as SJ01C, but in these cases the body form remains unclear. In addition to body shards and handles, there are rim shards that are too worn and small to be identified as any of the types defined above.

Types deriving from earlier periods (mainly shards):

As one should expect based on a multilayered settlement site, there is earlier material within the Iron Age habitation layers at Tel Kinrot. These vessels appear in the graphics of the shard material from the Iron Age layers. Their closer study will appear separately. **Oval jars with flaring rims** are interpreted as a Middle Bronze Age II–Late Bronze Age I type. These shards have wide mouths and strongly everted rims (stratum VIII/VII: 5154/1, 11093/10, 11161/1), and some fragments have combed decoration typical of Middle Bronze Age II. Another noteworthy group is the jars identified as **Early Bronze Age types**, which are rather common in the shard material. They were found especially in the upper mixed layers, and loci that can be interpreted as constructional fills. The shards are handmade, and the method of tempering is different from that of the Iron Age material; surface treatment with irregular slip is common, and the shards often are clearly worn. They can be divided into several types, but for the sake of simplicity they are here grouped together (Figs. 5.84–86).

	all shards		rims	
Jar type	Frequency	*Percent*	Frequency	*Percent*
Oval jar with ridged neck (SJ01A)	163	*39*	161	*44*
Oval jar with simple rim (SJ01B)	47	*11*	44	*12*
Carinated elongated jar (SJ02A)	9	*2*	9	*2*
Amphora jar (SJ03)	47	*11*	47	*13*
Wide necked amphora-jar (SJ04A)	18	*4*	18	*5*
Oval jar with flaring rim (MBII – LBI, SJ10)	22	*5*	22	*6*
EB-jars	55	*13*	50	*15*
Undefined/varia (SJ)	65	*15*	12	*3*
Total	426	*100*	363	*100*

Fig. 5.84 Storage jar types of the shard material from areas U & W of the KRP (all shards and rims separately).



Figs. 5.85a and b. Jar types and their share in areas U & W of the KRP, a) all shards, and b) rims.

Crosstable of Jar type & local stratum (Areas U/W)							
Jar types \ Stratigraphical context	stratum						Total
	0	1	2	W3/U3a	U3b	U4	
SJ01A oval jars with double thickened rim	50	15	31	34	31	0	161
SJ01B oval jars with simple rim	10	5	8	9	12	0	44
SJ02A Carinated elongated jars	1	0	2	3	3	0	9
SJ03 Amphora-jars	9	8	6	8	16	0	47
SJ04 Wide necked jars	3	3	3	6	3	0	19
SJ10 open mouthed jars (MBII-LBI)	4	5	6	4	3	0	23
EB-jar types	8	5	6	16	11	4	54
SJ undefined jars	6	1	1	4	0	0	12
Total	91	42	63	84	79	4	363

Fig. 5.86 Jar types and their stratigraphic provenience in areas U and W (rims only).

5.2.5 Small Containers: Jugs, Juglets, Flasks and Pyxides

Jugs

I consider the jug as a relatively high and closed vessel, a container for liquids and tableware – as in the modern usage, although their use in antiquity remains an inference. At Tel Kinrot, as well as in Israel-Palestine in general, most jugs have a globular or ovoid body and one handle extending from the neck or the rim to the shoulder, though some jugs have no handles at all. Many jugs have a lip designed to be suitable for pouring (Hendrix et al. 1997: 46; Yon 1981: 65). I have defined jugs as closed vessels up to 35 cm high and 25 cm wide at the maximum, with one handle or no handles at all. Features that set jugs apart from jars are their smaller size, one handle at maximum, and the pinched or trefoil shape of the opening. Illustrations of jugs are included in Appendix 5H.

As at many other sites, and also in the case of Tel Kinrot, jugs are a heterogeneous group including diverse body and rim forms as well as varying sizes (Mazar 1985: 61; Anderson 1988: 200–201; Mazar & Panitz-Cohen 2001: 109; Zarzecki-Peleg et al 2005: 320; Arie 2006: 203–207; Panitz-Cohen 2009: 245). The capacities I was able to measure from well preserved vessels varied between 2 and 9 liters. I decided to use the neck-width as the major feature defining the jugs in general, as well as establishing the types at Tel Kinrot. This was because establishing the presence or number of handles or the presence of a pinched/trefoil mouth are often impossible with the fragmentary material. However, there is a problematic overlap between jars and jugs, as at many other sites both during the Iron Age (e.g. Bonfil 2003; Zarzecki-Peleg et al. 2005) and the Late Bronze Age (Liebowitz 2003). Most especially, the largest jugs of JG03 overlap in size with smallest jars (SJ03). I have classified rims as deriving from jars if they have been 80 mm or more in diameter, unless there was a reason to classify them as jugs based on having only one handle or a smaller over-all size. An overlap can also be noted in the capacities of jars and jugs at Tel Beth Shean (Panitz-Cohen 2009: 233, 243). At Tel Kinrot, there are two size categories of jugs: the smaller types (JG01, JG02B–C, JG05 and JG09) are often painted with geometric patterns in red, or red and gray/black. The larger types (JG02A, JG03, and JG04) are usually plain, with no surface treatment. Most jug types seem rather unstandardized in their morphology (varying rim shapes), while the spherical decorated jug JG05 is very consistent in form and decoration. The chronological distributions of jugs vary, and many types are long living.

The Tel Kinrot assemblage includes 31 whole or almost whole jugs and 23 large fragments. Altogether ca. 470 items have been classified as jugs in the pottery assemblage of the KRP as a whole (out of over 3700 vessels). In the intensively retrieved areas U/W, there were 267 jug rims (12.3 %). The majority of the items are rim fragments, even though several jug types can be identified from the body shards as well. The share of the vessel types differs from one context to another. This is well illustrated by the different shares of jugs in the Megiddo stratum VI assemblages, ranging from 7 to 35 % in different contexts (Arie 2006: 236–239). In the Main Iron I Horizon at Tel Kinrot, the jugs are quite often found together with other small containers (juglets, flasks or pyxides). The jugs derive from domestic contexts in all areas.

The frequency of jugs at Tel Kinrot is similar to that from Timnah stratum V with 14 % (Panitz-Cohen 2006: 10), Tel Yin'am stratum XII, dated to the end of the Late Bronze Age, with 10 % (Liebowitz 2003: 107), and the published Iron Age pottery from stratum XII/XI at Hazor with 10 % (counted from illustrations, as sound statistics are lacking: Ben-Ami & Ben-Tor 2012: 28–51). The share of jugs at Tel Kinrot is lower than that of the Iron Age strata XVIII–XII at Yoqneʿam, ranging between 20 and 33 % (Zarzecki-Peleg et al. 2005), or at Megiddo, where their share ranges between 14 and 20 % (Arie 2013a) and higher than the figures from Tel Beth Shean with 5–7 % (Panitz-Cohen 2009: 197, 251).

JG01A: Oval Jugs with a Tall, Narrow Neck


Fig. 5.87 jug 12807/1

The body is oval, or slightly carinated, and there is usually a shallow ring base. The neck is ca. 5 cm wide and 5 cm or more high. The neck builds up a considerable part of the whole height of the vessel. Most of these jugs have originally been ca. 19–25 cm high. The neck is upright and often slightly widens towards the opening. The rim is simple or slightly thickened. Jug 12807/1 has a slightly pinched mouth. The walls tend to be ca. 5 mm. thick, and thus slightly thinner than in the other jug types. One loop handle runs from rim (or from mid-neck or) to the upper part of the shoulder. There are 20 items of this type altogether, of which nine can be described as well preserved. Four are decorated with red painted bands (8517/2, 10625/6, 12807/1, 12875/1, Fig. 5.87). Two jug fragments from the Post-destruction Phase are slipped: jug 4085/1 in red and jug 12068/13 (not illustrated) in white. The latter also has painted bands in gray and red. Three rim fragments from the Main Iron I Horizon (10642/5, 10776/3, 10796/1, not illustrated) have traces of vertical burnish. The clay is lightly tempered with varying minerals, foremost of which chalk, basalt, and quartz have been identified. The prevalence of basalt is lower than in the other types of jugs. Most oval jugs are recorded as medium hard, thus they are slightly harder than the jugs in general (most jugs are recorded as medium hard).

This kind of jug occurs at many sites in small numbers from the end of the Late Bronze Age to late Iron Age I. Later on, morphologically similar jugs start to have burnish, red slip, and bichrome decoration. The well preserved jugs from Tel Kinrot have red bands only.

<u>Distribution:</u>
Foundation Phase: 10759/1.
Main Iron I Horizon, earlier phase: 10239/31, 10674/8 (part of a trefoil mouth), 10796/1.
Main Iron I Horizon: 6681/1, 8517/2, 9613/1, 11561/2, 12807/1, 12875/1 (and seven shards not illustrated).
Post-destruction Phase: 4083/1, 10276/4, 12068/13 (body shard, not illustrated).

<u>Parallels JG01</u>
Jordan Rift Valley: **Dan,** Type J2: Stratum VI: Ilan 1999: 88, Pl.51:1. Stratum V: ibid: Pls. 28:5, 35:6. Stratum IVB: ibid: Pls. 6:9; 7:1; 8:11; 13:3, 9; 17:5. **Hazor,** Stratum 1B: Yadin 1960: Pl. CXX:10; CXXXII:2; CXXXIII: 12–14; CXXXIX:11–12; Yadin 1969: Pl. CCXCII:14. Stratum XII/X (Phase 8 in area BA): Yadin 1969: Pl. CCXXXVIII: 10, 23. Stratum X: Yadin 1969: CLXXII: 3; Ben-Ami 2012: Fig.2.8:23; 2.9:21. **Tel Hadar,** Stratum IV: Yadin/ Kochavi, pers. comm. **ᶜEin Gev,** Stratum III: Mazar/Biran/Dothan/Dunayevsky 1964: Figs. 5:4, 8; 6:5–6. **Tel Yin'am,** Stratum XIA: Liebowitz 1979: Fig. 7:8. **Um ad-Dananir**, Cave 4: McGovern 1986: Fig. 52:36; 53:38–39. **Tel Beth Shean,** Level VIII: James/McGovern 1993: Fig. 31:11. Level VII: ibid: Figs. 10:9; 28:7, 13. Level VI Early: James

1966: Fig 10:14; 52:16, 19, 22; 56: 1–3; 57:11, 14; (Stratum 4): Jug class 3b: Yadin/Geva 1986: 65–66, Fig. 27:2; (S-3) type JG71: Panitz-Cohen 2009: 246, Pls. 41:20; 51: 2–3, 5; 65:11. Lower Level V: James 1966: Fig. 18:20, 26. **Tel Rehov,** Phase D-3: Mazar/ Bruins/Panitz-Cohen/van der Plicht 2005:Fig.13.9:9. **Pella**, West cut, Stratum 6: Smith/Potts 1992: 84, Fig.66:8. **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Figs. 297:1, 3. Phase XIII: ibid: Fig. 170:1. **Tell Deir ᶜAlla,** The LB Sanctuary, Phase E3: Franken 1992: Fig. 4-10:34, 36–37. Phase E6: ibid: Fig. 4-24:8. The Iron Age habitation, Phase B: Franken 1969: Fig. 52:5. Phase G: ibid: Fig.65:61. **Tell es-Sa'idiyeh**, Tomb 102 of the earlier period: Pritchard 1980: Fig. 5:4.

Jezreel Valley: **Megiddo,** Jug type J2: Arie 2006: 203–204. Stratum VIIA (Level F-7): Ilan/Hallote/ Cline 2000: Fig.9:14:15. Stratum VIB: Finkelstein/Zimhoni/Kafri 2000: Fig.11.7 (=Loud 1948: 73: 2). Stratum VIA: ibid: Fig.11.11:15 – 16 (=Loud 1948: Pls. 75: 10, 13); Arie 2013a: 503, Fig. 12.78:1. **Yoqneᶜam,** Stratum XVII: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 322, Figs. I.11:2, I.12:11=II.40:3, I.23:15–16. **Tell Qiri,** Stratum VII: Ben-Tor/Portugali 1987: 113, Fig 24:5, Jug group JII Narrow necked jugs: Hunt 1987: 198. **Tel Qashish,** Stratum IIIB: Ben-Tor/Bonfil 2003: Fig. 134:4. **Taanach,** Phase IA: Rast 1978: Fig. 3:4 and 6:16.

Phoenician Coast: **Tell Keisan,** Level 9c (Pit 6067): Puech 1980: 218, Pl. 71: 1, 1a. Level 9a–9b: Briend 1980: 208–209, Pl. 61:15. **Tell Abu Hawam,** Stratum V: Hamilton 1935: 36, Fig. 226. Stratum IV: ibid: 30, Fig. 168. **Dor,** Jug type PJ 15, with *bichrome* decoration: Horizon Ir1b (Phase 7a in area G): Gilboa/Sharon/Zorn 2004: Fig.9:11. Horizon Ir 1|2: Gilboa/Sharon 2003: 29, Fig.11:8–10. **Tyre**, Stratum XIII-1: Bikai 1978: Pl. XXXIII: 20. Stratum XIII-2: ibid: Pl. XXXVII: 2, 13.

Philistine Coast: **Qasile,** Parallels are of Mazar's Types JG1/JG2. Stratum XI: Mazar 1985: 63, Fig. 26: 21 Stratum X: ibid: Figs. 36:3; 41: 9, 15; 49:2–4. **ᶜIzbet Sartah,** Stratum III: Finkelstein 1986: 44–45, 76, Fig.15:16.

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993:47–48, 162, Fig. 6.50:9. **Tell el Farah (N),** Level VIIb: Chambon 1984: Pls. 48:15; 49:6, 8.

J01B Globular Jugs with Narrow Neck

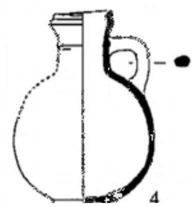


Fig. 5.88 Jug 8867/1

Three plain jugs with high and narrow necks have globular, almost spherical bodies and thickened, modeled rims. They have no surface treatment or decoration. Jug 7173/3 is 30 cm high and 18.5 cm wide at the maximum, and it has a rounded base and handle running from rim to shoulder. Jug 8521/1 is 33 cm high and 25 cm wide, and has a rounded base and a handle from mid-neck to shoulder. Jug 8867 (Fig. 5.88) is 17 cm high and 15 cm wide, and has a shallow ring base, handle from neck to shoulder, and a ridge at the mid-neck. The body fragment 9395/1 has a globular body of roughly the same size as the larger globular jugs (7173/1, 8521/1), and three painted striped on the shoulder – a feature more typical for the more slender jugs categorized within the Oval jugs JG01A). The rim of fragment 11200/8 is exceptionally thick (17–33 mm). I included it here because of the narrow mouth and modeled rim, even though the body form is unknown.

Distribution:
Foundation Phase: 7173/1.
Main Iron I Horizon: 8521/1, 8867/1, 9395/1, 11200/8.

Parallels JG01B
Jordan Rift Valley: **Tel Beth Shean,** Jug 74a: Late level VII (N-3): Panitz-Cohen 2009: 250, Pl.10:7. Level VI early (S-4, 3): ibid: Pl. 34:8; 38:8; 41:8. Level V (S-1): Mazar 2006: 361 (type 53), Pl.10:16.

Jezreel Valley: **Yoqneᶜam,** Stratum XV: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 322, Fig. II.40:1.

Philistine Coast: **ᶜIzbet Sartah,** Jug type 18: Stratum III: Finkelstein 1986: 44–45, 76. Stratum I: Fig: 23:12.

JG02: Spouted Jugs

Spouted jugs have a spout, and often sieve holes on the body, as their primary element of definition. In the rim fragments this element could not be observed in most cases. The body, neck, and rim forms vary, as well as the surface treatment. This heterogeneity is probably due to the many stages of production (*chaîne operatoire*) with the added spout, drilled sieve holes, and decoration or slip. The rim is preserved in only three vessels (of different subtypes). There does not seem to be a clear correlation between the added spout and the body form (see also Panitz-Cohen 2009). However, the small number and fragmentary nature of the material precludes any firm conclusions. The clay material is tempered with basalt and chalk. This small and heterogeneous group is divided into three subtypes, with a few items in each type. At other sites, such Megiddo and Qasile, the strainer jugs typically have a high neck, basket handle, and painted decoration, even in complicated designs (Arie 2006: 206; Mazar 1985: 95–98, Figs. 35; 36:1–2; 41:12; 50:1–3; 51:1.) The jugs at Tel Kinrot are relatively simple. The identification of the body shards with strainer or spout is easy, but the type is absent in the statistics based on rim counts, as no association with a specific rim form can be defined. Body shards with strainer holes indicating a body width of less than 20 cm have been classified as type JG2C, and shards with a wider body as type JG02A, while the jug type JG02B is defined by its tubular spout.

JG02A Strainer Jugs with a Wide Spout

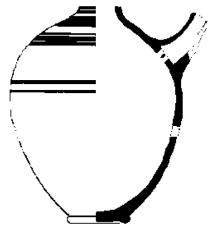


Fig. 5.89 jug 8194/1

One jug preserved from neck to base has been found in the Tel Kinrot Main Iron I Horizon, and one body shard. Jug 8194/1 (Fig. 5.89) is ca. 20 cm wide at maximum and 25 cm high and thus larger than the Oval jugs discussed above. It has a wide, tubular spout (3–4 cm wide), strainer holes at the wall inside the spout, an oval body, painted horizontal gray bands on the upper part of the body, and a low ring base. The neck was narrow, 4 cm at its base. No handles were preserved. The spout is attached to the shoulder. The body shard has a 5–6 cm wide spout and a red horizontal band. The oval, decorated strainer-spouted jugs are called "beer-jugs" in the Philistine repertoire (Chapman 1972: 61–65, Dothan 1982: 132–155) and though the general shape is similar, the Philistine jugs have a trough-shaped spout, open on its upper part. These coastal parallels have a loop handle extending from rim to shoulder and a high neck. The clay body of the Tel Kinrot jugs is tempered with basalt and chalk inclusions.

<u>Distribution:</u>
Main Iron I Horizon: 8194/1, 10513/1 (body shard, not illustrated).

<u>Parallels JG02A</u>
Tel Kinrot, Stratum VI: Fritz 1990: 28, Pl.56:6 (jug with bichrome net pattern).
Jordan Rift Valley: **Dan,** jug type J2b, Stratum VI: Ilan 1999: 88, Pl. 49:3. Stratum IVB: ibid: Pl. 13:2.

Jezreel Valley: **Megiddo,** Stratum VIA. Type J7b: Arie 2006: 206, Fig. 13.56:10; Finkelstein/ Zimhoni/Kafri 2000: Fig. 11.11:11–13 (=Loud 1948: Pl. 75: 20–23). **Yoqne**^{c}**am,** Stratum XVII: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 324, Fig.I.23:18, I.33:8.

Phoenician Coast: **Tell Keisan,** Niveau 9c, Pit 6067: Puech 1980: Pl.71:8b.

Philistine Coast: **Qasile,** jug type JG5b, Stratum X: Mazar 1985: 64, Fig. 50:1.

JG02B Small Jugs with a Tubular Spout

Fig. 5.90 Jug 10773/1

The two small jugs with narrow tubular side spouts have spherical bodies and a flat (10773/1, Fig. 5.90) or a low disc (7810/1) base. The short, tubular spout is placed above the mid-body. Jug 7810 is 14 cm high and 10 cm wide at the maximum. It has a flaring rim and a handle extending from rim to shoulder. Jug fragment 10773/1 is ca. 15 cm wide at the maximum and has painted horizontal bands in dark brown and red. The jug with a side spout is commonly referred to as a "feeding bottle", and often has a basket handle (e.g. Ilan 1999: 89). The shape derives from Mycenaean or Cypriote prototypes (Dothan 1982: 155–157 and note 113). The Late Mycenaean globular jars with a side spout occur with the basket and the loop handle (Furumark 1941: 32, 609, Fig. 6: FS 155, FS 160, FS 161). This form of jugs is relatively common on the coastal sites than in the inland, where it appears only occasionally. The jugs from Tel Kinrot are strongly tempered with basalt and chalk.

Distribution:
Main Iron I Horizon: 6677/1 (spout only), 7810/1, 10773/1.
Post-destruction Phase: 5540/1, 10969/1 (spouts only, latter not illustrated).

Parallels JG02B
Jordan Rift Valley: **Dan,** jug type J6, Stratum VI: Ilan 1999: 89, Pls. 49:1; 60:4. Stratum V: ibid: Pl. 1:3. Stratum IVB: ibid: Pl. 10:8. **Hazor**, Stratum Xb: Ben-Ami 2012: Fig.2.4:18. Stratum Xa: ibid: Fig.2.11:23. **Beth-Shean,** Level VII: James/ McGovern 1993: Fig. 22:1–2. Lower Level V (S-1): Mazar 2006: Pl.10:14. ᶜ**En Gev,** Stratum III: Mazar/Biran/Dothan /Dunayevsky 1964: Fig. 7:5–6. **Tell Abu al-Kharaz**, Phase XV/2: Fischer 2013: Fig.47:2. Phase XIII, ibid: Fig. 165:1. **Tell Deir ᶜAlla,** The LB Sanctuary, Phase E2: Franken 1992:Fig.4-6:9.

Jezreel Valley: **Megiddo,** Type J9, Stratum VIA: Arie 2013a: 505, Fig. 12.79:1; Arie 2006: 206–207, Loud 1948: Pl. 75:19.

Phoenician Coast: **Tell Abu Hawam,** Stratum III: Hamilton 1935: Fig 74. **Tell Keisan,** Level 9c (Pit 6067): Puech 1980: Pl.71:2. **Khirbet Silm** cemetery: Chapman 1972: 66, Fig. 2:9.

Philistine Coast: **Tel Qasile,** Stratum XI: Maisler 1950–51: Fig. 4:3; Mazar 1985: 97, Fig. 30:11. Stratum X: Maisler 1950–51: Fig. 5:5. **Tell es-Sâfi/Gath,** Stratum E3: Zukerman 2012: 296, Pl. 13.1:3. Phase A4: Zukerman 2012: Pls. 13.13:12; 13.15:4 (=Maier 2006: Fig. 2:6, open spout and handle from rim to shoulder). Tel Sippor, Stratum II: Biran/Negbi 1966: Fig.6:10. **Tel Miqne/ Ekron,** Stratum VII (phase 9B): Killebrew 1998: Fig.6:31. Stratum VI: ibid: Fig.10:22. Stratum VB: Dothan/Gitin/Zukerman 2006: Fig.3.34:16. **Ashdod,** Stratum XIIIb: Yasur-Landau 2012: Fig. 7.36–37. **Tell el-Farah (S)**, tomb 636: Dothan 1982: Pl.59.

JG02C Squat "Beer Jugs"

Fig. 5.91 jug 10890/1

There are a few jugs with a squat, slightly biconical body and a wide, trough-shaped spout on the body with sieve holes. The only restorable jug 10890/1 (Fig. 5.91) of this type derives from the Post-destruction-phase. It is preserved from the rim to the lower part of the body. It has a wide and short neck, an everted simple rim, and a red slipped, burnished surface. The beginning of one loop handle extends from the shoulder towards the rim. The clay body is strongly tempered with basalt and quartz. Other occurrences of this type are only small fragments. Rim fragment 10207/1 from a *surface* context has four holes of the strainer and a beginning of a spout just below the rim. There is no neck. The upper part of the vessel is inverted, and resembles a jug or a goblet. The limited preservation makes comparisons difficult. However, vessels that have reminiscent upper parts derive from Tel Dan, stratum IVB: one goblet and one rim fragment (Ilan 1999: Pls. 14:2, 17:11). A small tripod cup with sieve holes below the rim derives from Tell Qiri, stratum VII (Ben-Tor & Portugali 1987: Fig.14:1). Though beer jugs often have high necks, there are also vessels without neck, e.g. at Megiddo stratum VIIB (Finkelstein/Zimhoni 2000: Fig 10.7:6=Loud 1948: 63:7), and with a short and wide neck, such as in Qasile stratum X (Mazar 1985: 64–65, Fig. 35:2; 36:1; 50:3). The hand burnished, red slip of the only well-preserved vessel are features typical of the Iron Age II (Mazar 1998: 373–377). While its context was not sealed, it cannot be excluded that is not intrusive. However, no extant Iron Age II remains appear on the slope and it would be exceptional that a vessel would be so well preserved, had it been washed down from the acropolis. Rather, this jug may indicate, that the Post-destruction Phase could have lasted until the beginning of Iron Age II.

<u>Distribution:</u>
Main Iron I Horizon: 12631/2, 10863/11, 11105/24, 12149/15 (not illustrated).
Post-destruction Phase: 10890/1 (L4347: packed soil on a living floor, but not a sealed locus).
Later deposits: 10207/1.

<u>Parallels JG02C</u>
Jordan Rift Valley: **Dan,** Type J5, Stratum VI: Ilan 1999: 89, Pls. 44:7, 60:6. Stratum V: ibid: Pl. 22.11; 43:7. Stratum IVB: ibid: Pl. 13:7; 14:2. **Hazor,** Stratum XII/XI: Yadin 1969: Pl. CCI: 24. ^{c}**En Gev,** Stratum III: Mazar/Biran/Dothan/Dunayevsky 1964: Fig. 7:3–4. **Tel Beth-Shean,** Stratum VII: James/ McGovern 1993: Fig. 40:3. Stratum VI early (S-3): Panitz-Cohen 2009: Pl.38:10; 42:14; 51:1; 54:16. **Tell Deir ^{c}Alla,** The LB Sanctuary, Phase E8: Franken 1992:Fig. 5-7:23.

Jezreel Valley: **Megiddo,** Stratum VIA. Strainer jug with a carinated body and a basket handle (J7a) has a squat body, but an elaborate decoration and a long spout: Arie 2006: 205, Fig. 13.60:2. **Yoqne^{c}am,** Type JVB Strainer jug with biconical body has a similar body profile but a high neck, basket handle and elaborate decoration. Stratum XVII: Zarzecki-Peleg 2005: Fig.I. 23:19; Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 324. **Taanach,** Phase IB: Rast 1978: Fig.11:15.

Phoenician Coast: **Tell Keisan,** Level 9c (Pit 6067): Puech 1980: 219, Pl.71:8c.

Philistine Coast: **Qasile,** Stratum X: Mazar 1985: 64–66, Figs. 36:1, 50:3 (with basket handles, squat body and red slip). **Azor,** Tomb D74: Ben-Shlomo 2008: Fig. 17:6. ^{c}**Izbet Sartah,** Stratum II (silo): Finkelstein 1986: Fig. 19:12 (squat jug with red slip, vertical burnish and handle from the rim to the shoulder is very similar to jug 10890/1).

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/Finkelstein 1993: Fig. 6.47:9.

JG02D Basket handles


Fig. 5.92 jug 11157/8

As most strainer jugs (both oval and squat) from other sites have basket handles, I decided to include the five fragments of basket handles from Kinrot here, although no vessel profile or strainer could be reconstructed. None of them can be assigned to a specific jug type, due to their fragmentary state of preservation. They usually have painted decorations. It is difficult to estimate their mouth widths, but it seems to vary between 10 and 16 cm. Four fragments were found in the Main Iron I Horizon (11157/8, 10481/8, 12149/11 and 12172/5) and one in a later context, but probably deriving from the Iron I period (10220/9). The only illustrated jar fragment with a basket handle 11157/8 has a simple rim and a ca. 15 cm wide mouth. Decoration is composed of red and dark brown geometric lines and zigzags. This kind of handle is attached to jugs with strainer-spouts at Qasile, stratum X (Mazar 1985: Figs. 35:1, 3; 36:1; 50:3) or Yoqneᶜam, stratum XVII (Zarzecki-Peleg 2005: Fig.i.31:4). Another basket handle was attached to a plain open rim (from the colluvium below the topsoil: 10220/9 not illustrated). Due to the fragmentary nature of the Tel Kinrot material, I did not include a parallels section.

JG03A: Rounded Jugs with a Tall and Wide Neck

Fig. 5.93 Jug 12861/1

This is a large and rather incoherent group, which (as a result) includes most jugs at Tel Kinrot. They have an oval, or a rather globular, body and upright neck (Fig. 5.93). The full height of the vessels ranges between 20 and 30 cm, and the maximum width between 16 and 25 cm. The handle extends from the rim to the upper part of the body, above the shoulder. There is also at least one vessel that seems to have no handles. The base form varies: it is most commonly rounded (e.g. 12707/1), but flattened (9281/1), disc (4815/5), and shallow ring bases (7454/2) occur as well. The neck is 5.5–9 cm high and usually 7–10 cm wide, usually upright or slightly flaring. The rim form and thickness varies as well, but most rims are thickened on the lip and/or below it. Many jugs have trefoil mouth (e.g. 7675/1, 7715/1). The thickness of the lip varies considerably, between 5 and 16 mm, but most rims are 8–10 mm thick. The thickness below the lip is usually smaller, 4–6 mm. These jugs are usually plain and their clay is strongly tempered, mainly with basalt, chalk, and quartz particles of both small and coarse size. They are of medium hardness.

In addition to the well-preserved vessels, there are a hundred jugs classified as JG03A from the Kinneret Regional Project excavations (97 items from areas U/W). Few fragments derive from the Foundation Phase*,* and almost half of the rim shards were found in the Main Iron I Horizon*,* ca. 20 % from the Post-destruction Phase*,* and ca. 30 % from later deposits. Similar broadly defined groups at other sites generally have a wide temporal distribution as well, ranging from the end of the Late Bronze Age to the transition of Iron Age I to II.

<u>Distribution:</u>
Foundation Phase: 6464/1.
Main Iron I Horizon: 4815/3, 4815/5, 6597/1, 6598/3, 7454/2, 8701/1, 8582/1, 9122/1, 9281/1, 9322/2, 9573/1, 12707/1, 12816/1, 12861/1.
Post-destruction Phase: 7675/1, 8693/1.
Later deposit: 10226/1.

<u>Parallels JG03A</u>
Jordan Rift Valley: **Dan,** Jug type J1a (both in typologies by Ilan 1999 and Ben-Dov 2012: 242) Stratum VIII: Ben-Dov 2012: Fig. 67:17. Stratum VII: ibid: Fig. 94:15. Tomb 387 (Stratum VIIB): Ben-Dov 2002: 70–72, Fig. 2.57: 32, 34, 38. Stratum VI: Ilan 1999: 87–88, Pls. 38:11; 53:3; 60:2–3. Stratum V: ibid: Pls. 22:12; 23:7; 24:6; 27:10; 34:3–4; 36:12. Stratum IVB: ibid: Pls. 3:4–5;6:5; 8:13; 14:1; 17:3–4. **Hazor,** Stratum 1: Yadin 1958: CVIII: 5–7; Yadin 1962: Pl. CXX:12; CXXXII: 3, 10; CXXXIX:14; CXLII:7. Stratum XII/IX: Yadin 1969: Pls. CLXVI: 10–12, CLXXVI: 1–3, CCI: 18–23, CCII: 4, CCIII: 18; Aharoni 1989: 29, 38; Amiran 1989: 80; Bonfil 1997: 114–121, Figs. II.35:11, 38:14–15, 39:13; Garfinkel 1997:223, Fig. III.19:7;Ben-Ami/Ben-Tor 2012: Figs. 1.1:23; 1.6:7; 1.7:11; 1.9:14. Stratum X: Ben-Ami/Ben-Tor 2012: 429: Fig. 5.8:1, 11. Stratum IX: Yadin 1969: CCVIII: 41. **Tel Hadar,** Stratum IV: Kochavi/Yadin, pers. comm. **ᶜEn Gev,** Stratum III Mazar/ Biran/Dothan /Dunayevsky 1964: Fig. 6:1, 3, 4). **Um ad-Dananir**, Cave 4: McGovern 1986: Fig. 52:37. **Tel Beth-Shean,** Stratum VII: James/ McGovern 1993: Fig. 22:13. Long necked Jug types

2a and 3a, Stratum VI early (4): Yadin/Geva 1986: 63–64, Figs. 26:5; 27:1; (S-4) Panitz-Cohen 2009: Fig. 30:12–13; (S-3) 54:17. Stratum VI late–Lower Level V: (2) Yadin/Geva 1986: 16, 26, Figs. 9:3, 11–12; (1): ibid: 16, Fig. 7:7–10. **Tel cAmal**, Stratum III: Levy/Edelstein 1972: Fig.10:11. **Tel Rehov,** Stratum VII (D-3): Mazar/Bruins/Panitz-Cohen/ van der Plicht 2005: 207, Fig. 13.9:8, 10–11. **Pella**, Phase II: Smith/Potts 1992: Pl.48:1. Phase IA: ibid: Pl.52:17. **Tell Abu al-Kharaz**, Phase XII: Fischer 2013: Fig.126:2. Phase XIV: ibid: Fig.200:3. Phase IX (Area 9): ibid: Figs. 302: 5; 305: 1. Phase X (Area 9): ibid: Fig. 368:7. Phase XI (Area 9): ibid: Fig. 370:11. **Tell Deir cAlla,** The LB Sanctuary, Phase E3: Franken 1992:Fig.4-10:38. Phase E7: ibid: Fig. 5-4:18. Phase E8: ibid: Fig. 5-8:27–29. Phase E10: ibid: Fig. 5-15:22–23. Phase E: ibid: Fig.7-19:227–228. The Iron Age habitation, Phase B: Franken 1969: Fig. 51:20–24; 27–29. **Tell es-Sa'idiyeh**, Tomb 137 of the earlier period: Pritchard 1980: Fig.38:1.

Jezreel Valley: **Megiddo,** Jug type JG60, Stratum VIIB: Martin 2013: 387; Figs. 10.23:10–11; 10.24:1. Jug type J1, VIIA: Arie 2013a: 502, Figs. 12.70:5; 12.85: 5–6. Stratum VIA: Finkelstein/ Zimhoni/Kafri 2000: Figs.11.3:1; 11.11:14; 11.14:16 (=Loud 1948: Pl. 75:1, 2) Arie 2006: 203, Figs. 13.56:7, 13.65:1, 13.68:5. Stratum VB: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.26:14–16 (=Lamon/Shipton 1939: 6:155, 159–160). **Yoqnecam,** Jug type 1 (wide necked jugs), mostly of medium or tall height: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 320, 329–330, Fig. II.39:1–2. Stratum XVIII: Zarzecki-Peleg 2005: Figs. I.12:9; I.13:6; I.32:29, 34. Stratum XVI: ibid: Fig. I.37:14. Stratum XV: ibid: Fig. I.49:28. Stratum XIV: ibid: Figs.I.59:22; 61:24 (rims only). **Tell Qiri,** Jug I, wide necked jugs, Strata IX–VII: Hunt 1987: 198, Fig. 40: 3–4. **Taanach,** Period IA: Rast 1978: Figs. 1:3–4; 3:1–3; 4:6; 6:4–13. Period IB: ibid: 11:1–12; 15: 6–11. Period IIA: ibid: Figs. 19:4, 6; 20:2–3; 22:2–3; 25:4, 26:2.

Phoenician Coast: **Tell Keisan** Level 9c (Pit 6067): Puech 1980: 219, Pl.61: 1–2. Level 9a-b: Briend 1980: 209–210, Pl. 71:5. Level 8: ibid: Pl.56:8. **Tell Abu Hawam,** Stratum III: Hamilton 1935: Figs. 80, 82, 83.

Dor, Type JG2, Ir1a (*l*)–Ir2a horizons: Gilboa/Sharon 2003: 28. Ir1b horizon: ibid: Fig. 8:19–20.

Philistine Coast **Tell Qasile,** Jug type JG 1 Stratum XII: Mazar 1985: 61, Figs. 15:6; 17:4. Stratum XI: ibid: 27:15; 30:10. Stratum X: ibid: 41:10; 44:14, 32; 49:2–4, 11.

Central Hill Country: **cIzbet Sartah,** Type 17, wide necked jug is popular in strata III–I, but also includes cooking jugs affecting the frequencies. Stratum III: Finkelstein 1986: 40, 43–45, 72–74, Fig. 13:9. Stratum II: ibid: Fig. 15: 19, 21; 16:15; 19:9. Stratum I: ibid: Figs. 21:7; 22:6–8, 23:11, 24:16–19. **Shiloh**, Stratum V: Bunimowitz/Finkelstein 1993:47–48, 162, Figs. 6.47: 7–8, 10; 59: 5–7. **Tell el Farah (N)**, Level VIIa: Chambon 1984: Pls. 48: 10–11, 18. Level VIIb: ibid: Pl. 48: 2, 4–5, 7, 12–16; 49:1, 5, 9–11. Level VIIe: ibid: Pl.49:2, 9–11.

JG03B: Rounded Jugs with a Short and Wide Neck


Fig. 5.94 jug 14396/1

These jugs have a rounded and rather globular body, and a short (3–5 cm) and wide (7.5–11 cm) neck (Fig. 5.94). The rim is everted and the rim is usually simple or thickened, but not strongly modeled. One loop handle usually extends from rim to shoulder. Few examples are preserved until the body, which is undecorated and rather wide (most commonly 21–23 cm). All the preserved bases are rounded. Similar forms at other sites are often cooking jugs. Despite the morphological affinity, these jugs at Tel Kinrot should not be considered cooking ware, as suggested by Münger (2013: 156). The clay of these vessels is light reddish-yellow, and none of them has traces of contact with fire. The clay body is tempered with basalt and chalk, differing from the cooking wares but in line with jugs of type JG03A. The jugs are of medium hardness.

Distribution:
Main Iron I Horizon: 7792/1, 8193/4, 8503/1, 8700/1, 8732/3, 9078/1, 9322/1, 9664/1, 11328/1.
Post-destruction Phase: 4149/1, 7637/1.

Parallels JG03B
Jordan Rift Valley: **Dan,** Type J1, Stratum VI: Ilan 1999: 87–88, Pls. 56:10; 60:1, 8; 62:4. Stratum V: ibid: Pl. 22:10. Stratum IVB. ibid: Pl. 17:7. **Hazor,** Stratum XB: Yadin 1969: Pl. CLXXII: 5. **Tell Zarʿa**, Phase IV.2: Dijkstra/ Dijkstra/Vriezen 2009: Fig. 4.6:6. **Beth-Shean,** Bottle type 2 Level VI early (4): Yadin/Geva 1986: 68, Fig. 27:10. Lower Level V (S-1): Mazar 2006: cooking jug 51b: 359, Pl.8:1; (P-7): ibid: Pl.40:5. **Tell Abu al-Kharaz**, Phase XII: Fischer 2013: Fig. 151:4. **Tell Deir ᶜAlla,** The LB Sanctuary, Phase E1: Franken 1992: Fig.4-3:20.

Jezreel Valley: **Megiddo,** Stratum VIIA: Finkelsteini/Zimhoni 2000: Fig.10.9:3 (=Loud 1948: Pl. 67:14).Stratum VIA: (*Cooking jug* type CJ1a, a jug of not-cooking pot ware and no traces of use on fire) Arie 2006: 202, Fig.13.59:8; Loud 1948: Pl. 67:13; Finkelsteini/Zimhoni /Kafri 2000: Fig.11.14:16 (=Loud 1948: 75: 2). **Yoqneᶜam,** Some jugs of the type 1: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 320–322. Stratum XVII: Zarzecki-Peleg 2005: Fig. I.23:11. Stratum XV: ibid: Fig. I. 64:36. Stratum XIV: ibid: Fig.I.41:6; 50: 20; 69:10. Stratum XII: ibid: Fig. I.78:6.

Phoenician Coast: **Tell Abu Hawam,** Stratum III: Hamilton 1935: 21, Pl. 13, Jug 76. **Tell Keisan,** Level 9a-b: Briend 1980: Pl.61:4. **Dor**, Ir 1b horizon (G-7a): Gilboa/Sharon/Zorn 2004: Fig. 9:7; morphologically close Cooking jug type JG 7G: Gilboa/Sharon 2003: 28, Fig 8: 17.

Philistine Coast: **Tell Qasile,** Jug type JG 3: Mazar 1985: 63. Stratum XII: ibid: Fig. 15:7. Stratum XI: ibid: Figs. 25:17; 30:5. Stratum X: Figs. 44:15; 49: 10, 12–13.

Central Hill Country: **Shiloh,** Stratum V (silo): Bunimowitz/Finkelstein 1993: 6.59:4.

JG03C Squat Jugs with Short and Narrow neck

Two examples have a narrow and short (3 cm) neck, wide body, and a loop handle extending from the rim to the shoulder (see Appendix 5H). Jug 7833/1 is 13.5 cm wide and 14 cm high, the neck is 4 cm wide, and the mouth is pinched. Jug 6636/1 is 15 cm wide and ca. 14 cm high. Both vessels have a clay body tempered with small basalt and few larger grits of chalk.

Distribution:
Foundation Phase: 7833/1.
Main Iron I Horizon: 6636/1

Parallels JG03C
Jordan Rift Valley: **Tel Beth Shean,** Level V (S-1): type JG53: Mazar 2006: 361, Pl.10:16 (similar profile with Jug 7833/1). **Tell Abu al-Kharaz**, Phase XIII: Fischer 2013: Fig. 165:2. **Tell Deir ᶜAlla,** The LB Sanctuary, Phase E10: Franken 1992:Fig. 5-14:21.

JG04: Decorated Jugs with Spherical Body


Fig. 5. 95 Jug 10751/1

The decorated jugs with a spherical body form a distinctive and relatively homogeneous type. Several well-preserved examples have been found in the Main Iron I Horizon (Figs. 5.95–96). The vessels are very uniform in form, size, and decoration. They have a spherical body, round base, and a narrow, upright, and high neck. The horizontal grooves on the interior surface indicate throwing on the fast wheel from the base to neck. The body is 16–22.5 cm wide and 17.5–30 cm high. The neck is generally at least 5 cm high. The rim is slightly everted or upright, simple and rounded, sometimes slightly thickened. The mouth is 35–50 mm wide. The rim is 5–6.5 mm thick, and the wall at the neck is slightly thinner (4–5.2 mm). These jugs have one simple- or double loop-handle running from a ridge at the middle of the neck to the upper part of the shoulder.

The decoration consists of two groups of concentric circles. The arrangement of the circles combines thin and broad lines, but lacks the systematic design syntax identified by Gilboa for the coastal sites (1999: 5–12). In the bichrome patterns there is a preference for the outer dark brown lines to be thin and the mid band in red to be broad. The monochrome designs in particular are less fixed, presenting creative variations and combinations on several motifs, parallel with the material presented from Tel Dor from Early Iron Age IA–B (Gilboa 1999: 2–9). Between the circles there is sometimes another geometric pattern on the side, mainly on the opposite of the handle (10789/1, 10751/1, 12876/1, 7169/1, 10310/1, 11075/9, 10300/1 and 9575/1), but sometimes also below the handle (7250/3, 9401/1, 10300/1). The patterns include net patterns, rhombs, horizontal lines, concentric circles, and (encircled) crossing stripes. The net pattern has been identified as of Cypriote inspiration (Fritz & Münger 2002: 18), but the pattern was widely used on the coastal sites such as Dor, Tell Qasile, and the southern Philistine sites, and thus need not indicate a direct contact. A few jugs have horizontal stripes on the handle (9079/1, 10310/1). Six (or eight) vessels bear a bichrome decoration in red and dark grey/brown, while most jugs are only painted in dark grey/brown. Three jugs have monochrome red decoration (6621/1, 7169/1, 10488/1). Six jugs are burnished (8443/1, 9079/1, 10300/1, 10751/1, 10789/1, 12876/1), and three are white-slipped (11075/8, 10751/1, 12876/1). Monochrome vessels have been considered earlier than and bichrome ones, but the styles overlap in chronology. Both styles of decoration were found from the same phases and from the same loci at Tel Kinrot, similarly to Dor (Fritz & Münger 2002: 18; Gilboa 1999: 2–5). The variability in surface treatments might reflect the long lifespan of the Main Iron I Horizon, or the individual production of these jugs.

Fig. 5.96 Jug 10300/1

The tempering of these jugs is distinctive: it is dominated by coarse particles of chalk, most commonly with some medium sized quartz as a secondary temper, and less often traces of organic tempering in small amounts. The clay core is generally mid-light gray, as is the color in the inside of the vessel. On the exterior surface the color is light reddish or yellow-reddish. This jug type is relatively frequent at Tel Kinrot, and is often well preserved. Most of the well-preserved jugs are actually of this type. This might be partially due to their small size, being less prone to breakage. They were mainly found in a few contexts with a large amount of restorable pottery. One fragment derives from the Foundation Phase, and 22 items derive from the Main Iron I Horizon. Three jugs of this type were identified macroscopically as Phoenician imports by Fritz (9079/1, 9575/1, 6992/1). These Phoenician style jugs and their relative frequency indicate ties to the Phoenicia, even if they were of local production. The provenience needs to be corroborated by a petrographic or chemical analysis. Such small containers could have been traded for their contents, as suggested by Arie et al. (2006: 565).

Morphologically, the spherical jug closely resembles a globular flask. The difference is technical: the jug is thrown on a wheel from base to neck, while the flask is thrown on its side and the neck is joined at later stage. The difference is easy to recognize from the traces of wheel throwing on real vessels, but is often difficult to identify from drawings (many drawings indicate lines on inner walls, and I have interpreted such as wheel marks). Caution needs to be called for with assumed parallels if their manufacturing technique is unclear. At Tel Kinrot all the globular jugs have horizontal traces of wheel throwing. According to Bikai, this type developed into a ring based round-bodied jug during the Late Iron Age (1978: 37; Gilboa 1999: 12). This type occurs rarely in the south, probably as a result of trade (Fritz 1983).

Distribution:
Foundation Phase: 7250/3.
Main Iron I Horizon: 6621/1, 6992/1, 7169/1, 8250/1, 8443/1, 8546/2, 9079/1, 9401/1, 9657/1, 9575/1. *Main Iron I Horizon, earlier phase:* 10427/1, 10488/1, 10751/1, 10789/1, 11075/8, 11075/9, 12815/1, 12876/1.
Main Iron I Horizon, later phase: 10300/1, 10310/1, 12021/2, 14414/1.

Parallels JG04
The Jordan rift valley: **Dan,** Stratum V: Ilan 1999: 28:5 (neck only). Stratum IVB: ibid: Pls. 8:7; 13:3. **Hazor,** Stratum XII/XI (pits): Yadin 1969: Pls. CLXVI: 14; CCI: 29; CCII: 1. Stratum IXB: Yadin 1969: Pl. CLXXVI: 6–7. Stratum VIII (Phase 5C in area A): Bonfil 1997: Fig. II.36.13. Stratum VI: ibid: Fig. II.51:35. **Hadar,** Stratum IV (Yadin/Kochavi, pers. comm.). **Beth Shean,** Late level VI: James 1966: 27, Fig. 51:11; "the Philistine grave" (Oren 1973; unclear technique). **Tell Abu al-Kharaz**, Phase IX: Fischer 2013: Fig. 321:7. **Tell es-Sa'idiyeh,** Tomb 140: Pritchard 1980: Figs. 40:1; 66:1.

Jezreel valley: **Megiddo,** Jug type J4, VIA: Arie 2013a: 503, Fig. 12.85:7; Arie 2006: 204, Figs. 13.56:8; 13.69:4 (bichrome decoration); Finkelstein/Zimhoni/Kafri 2000: Fig.11.12: 5–8; 11.15: 6–7 (=Loud 1948: Pls. 78:12, 77:10; 75:14, 16; 80:1, 3). **Yoqneᶜam,** Stratum XVII: Zarzecki-Peleg 2005: Fig.I.17:8; I.28:1; I.31:5–6. Stratum XVI: ibid: Fig. I.37:11. Stratum XV: ibid: Fig. I.65:21. Stratum XIV: ibid: Fig. I.40:1. Jug/flask is "the most common bichrome jug type of stratum XVII," but it is unclear if the technique varies (Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005:327, Fig. II.41:1, 3).**Tel Qashish,** Stratum IIIC: Ben-Tor/Bonfil 2003: 346, Fig.132:11 (unclear technique).

Phoenician Coast: **Tell Abu Hawam**, Stratum V: Hamilton 1935: 249–251. Stratum IV: ibid: Pl.14:158. **Tell Keisan,** Level 9a-b: Briend 1980: Pl. 62: 3–5 (unclear technique). **Dor,** Ir1b–Ir1|2 horizons. The painted Bichrome jug types 11 and 12 at Dor have been described prolific in Ir1b and present in Ir1|2. The type 11 seems to be thrown as a flask while the type 12 seems to be thrown horizontally and thus a proper parallel for Kinrot JG05. Their popularity is presented combined and the share of jug type 12 is unclear (Gilboa/Sharon 2003: Figs. 9:10; 11:5, table 9). **Tyre,** Stratum XIII-1: Bikai 1978: Pl. XXXIII: 22, 25 (unclear technique). **Khirbet Silm/Joya,** cemeteries: Chapman 1972: 66-71, Figs. 3:46, 192, 191 and 4:50 (unclear technique).

Philistine Coast: **Tell Qasile,** Strata XI–X globular flasks of similar form and decoration, but made of two shells (Mazar 1985: 67–68). **ᶜIzbet Sartah,** Stratum II: Finkelstein 1986: Fig.15:16; Pl.10:3.

Central Hill Country: **Tell el-Farah (N),** Level VIIb: Chambon 1984: 202, Pl.50: 3–4 (red monochrome jugs).

S*outh of the country:* **Tel Masos**, Stratum II: Fritz 1983: 84–85, 87–88, Pls. 142:8, 146:1; 148:1; 152:7; 153:1). Probably imported from the Phoenician coast (Fritz 1983: 84, 87).

JG05 Amphoriskoi

The *amphoriskos*, i.e. a small amphora, is a small jar with two handles. Because of its small size, I included it within the jugs. One restored, undecorated vessel (10783/1, Fig. 5.97, locus 4328) has an oval body. It is 13 cm wide and 22 cm high. The neck is high and the mouth is 6 cm wide. The rim is pulled and simple, the base is tapering. A rim fragment with brown bands (12066/2) and a large fragment from the topsoil (10214/5) are probably of

Fig. 5.97 Amphoriskos 10783/1

amphoriskoi as well. These vessels are rare at Tel Kinrot, as is the case also with the sites providing parallels.

Distribution:
Main Iron I Horizon: 10783/1, 12066/2 (not illustrated)
Topsoil: 10214/5

Parallels JG05:
The Jordan Rift Valley: **Hazor,** Stratum XII/XI: Yadin 1969: Pl. CCIII:16; Ben-Ami/Ben-Tor 2012: Fig. 1.1:22. **Tel Beth Shean,** Stratum VII: James/McGovern 1993: Figs. 14:4; 25: 2–3; 29:6; 44:7. Stratum VI early: (4) Yadin/ Geva 1986: Fig. 27:11; (S-3a) Panitz-Cohen 2009: 262, Pl. 59:18. **Tel Rehov,** Stratum VII (D-4): Mazar/Bruins/ Panitz-Cohen/van der Plicht 2005: 207, Fig. 13.7:13. Stratum VI (C-2): ibid: 220, Fig. 13.18:13. **Tell Deir ᶜAlla**, LB sanctuary, Phase E8: Franken 1992: Fig. 5-6:19. Iron Age habitation: Phase G: Franken 1969: Fig.65:60. **Tell es-Sa'idiyeh**, Tomb 132 of the earlier period: Pritchard 1980: Fig.34:1.

Jezreel valley: **Megiddo,** Stratum VIA: Arie 2006: 211, Fig.13.58:8. Type AM1 vessels vary in size – the closest morphological parallel for the oval body has painted decoration and the neck is missing. See also Loud 1948: Pl. 77: 3; 84: 4.

Philistine Coast: **Qasile,** Stratum X: Mazar 1985: 60, Fig. 34:21–22 (with painted decoration).

JG06 Stirrup Jar


Fig. 5.98 Stirrup jar shard 12410/1

Though called "a jar" this vessel is of the size of a small jug. The stirrup (or false-necked) jar has a solid neck with a disc top. These kinds of vessels have a spout on the shoulder and two handles extending from the disc to the shoulders, and a wide, rounded body. They have been identified as Philistine, with Mycenaean prototypes (Dothan 1982: 115–125; Yasur-Landau 2012). One false spout and handle of a stirrup jar (10513/5) was found in the Main Iron I Horizon (L4275). The fragment has red painted decoration: the false spout is colored, the neck has a horizontal band, and the body seems to have concentric semicircles typical of this kind of vessels (Dothan 1982: 123, 209; Mazar 1985: 92). Body shard 12410/1 (Fig. 5.98, locus 3965, probably of the Main Iron I Horizon as well) has semicircles in black and red, and is most likely from a stirrup jar as well.

Parallels JG06:
The Jordan Rift Valley: **Tell Deir ᶜAlla,** The LB Sanctuary, Phase E1: Franken 1992:Fig.4-3:17–19.

Jezreel valley: **Megiddo,** Stratum VIB: Yasur-Landau 2006: 299–301: a well preserved lower part of a stirrup jar from Level K-5 has white slip and black painted decoration.

Philistine Coast: **Qasile,** Stratum XI: Mazar 1985: 92–95, Figs. 21:1–2; 31:2. Stratum X: ibid: Figs. 37:16, 38; 51:2–6 (most with elaborate bichrome decoration). **Tel Sippor**, Stratum II: Biran/Negbi 1966: Fig.6:13.

JG07 Biconical Jug

A rim shard 12045/6 (not illustrated) from the Main Iron I Horizon has an everted, 15 cm wide opening. It could be of a biconical jug typical for the Late Bronze Age. However, biconical jugs continue into the Early Iron Age at Tel Beth Shean (Panitz-Cohen 2009: 249–250), and the fragment may thus originate in Iron Age I as well.

JG08 Small Jug-Bottle

A rim fragment 11162/6 from the Main Iron I Horizon (L9953) has a narrow mouth (6 cm), thinned lip, and sloping shoulder. The width at the shoulder is 9 cm. The clay is tempered with medium-sized chalk particles and organic material.

Undefined Jugs JG09A and JG09B

Jugs classified as JG09A and JG09B are small shards, which cannot be assigned to any specific type described above. JG09A consists of small rim shards (154 rims from the KRP excavations). Type JG09B consists of decorated body shards. The decoration consists of monochrome or bichrome bands in red and/or dark brown/gray. Two body shards have a bichrome net pattern (11059/5, 12430/3), similar with the pattern from a spouted jug from Tel Kinrot, stratum VI (Fritz 1990: 27–28, Pl. 56:6) and on Philistine jugs (Dothan 1982: 214). A few shards have a monochrome net-pattern (12020/1), and one has a checker board design (11870/2), probably of Philistine inspiration (Mazar 1985: 95–96, Figs. 15:32, 35:1; Dothan 1982: 132, Figs 22:2; 23:1). Light colored slip occurs on some shards. Due to the fragmentary nature of material, I did not search for parallels in any systematic way.

Distribution (examples):
Main Iron I Horizon: 11017/1, 11067/7, 11059/5, 11075/5, 11200/5, 11200/6, 11561/2, 11833/4, 11870/2, 14346/1, 2.
Post destruction phase: 10230/1, 10267/4.
Surface: 12015/2, 12020/1.

Summary

Jugs are rather infrequent during the Iron Age at Tel Kinrot. The most common types are of the less coherent types (JG03 and Undefined JG09) with wide temporal distributions (Figs. 5.99–102). The distinctive Phoenician style jug JG05 is clearly concentrated in the Main Iron I Horizon and has a narrow temporal distribution in the Early Iron Age (but not the very first phase of it) and the transition of Iron Age I–II at other sites. Altogether the comparative materials derive from the end of the Late Bronze Age to the beginning of Iron Age II. The fairly common decorated spherical jugs of Phoenician style (JG05) indicate coastal affinities, and the less common strainer jugs also indicate coastal (Philistine) relations. Most jug types occur in almost all excavated areas, but the spherical jugs JG05 concentrate in areas J-R-S and U, while areas G and H did not include jugs at all. Area N also includes few jugs, and they are included in the counts of area U. It is noteworthy how the small sized spherical jug is much more frequently well-preserved than the larger jugs, which are most common in the shard material. Such a bias is probably due to the fact that vessel size affects friability, as well as the mode of use of the vessels. Without the quantitative material, our picture of jug frequencies would be strongly biased towards the small jug types.

	Type	rims & large		All shards		Whole vessels
Type	Name	Quantity	*Percent*	Quantity	*Percent*	Quantity
JG01	Rounded Jugs with Tall, narrow neck	10	*3.9*	12	*3.7*	1
JG02A-B	Spouted Jugs	-	-	2	*0.9*	-
JG2C	Squat Beer Jugs	2	*0.8*	3	*0.9*	1
JG03A	Oval Jugs with Tall, Wide Neck	97	*37.7*	97	*30.0*	1
JG03B	Rounded Jugs with Short Neck	11	*4.3*	11	*3.4*	-
JG04	Decorated, Spherical Jugs	5	*1.9*	10	*3.1*	5
JG05	Amphoriskoi	2	*0.8*	2	*0.6*	1
JG06	Stirrup Jar	1	*0.4*	1	*0.3*	-
JG07	Biconical Jug (LB I–II-type)	1	*0.4*	1	*0.3*	-
JG09A	Undefined Jug rims	138	*49.8*	128	*39.9*	-
JG09B	Undefined Jugs (body shards)	-	-	56	*17.4*	-
Total		**257**	*100*	**321**	*100*	9

Fig. 5.99 Jug types from the Iron Age layers of the areas with intensive retrieval (U/W).

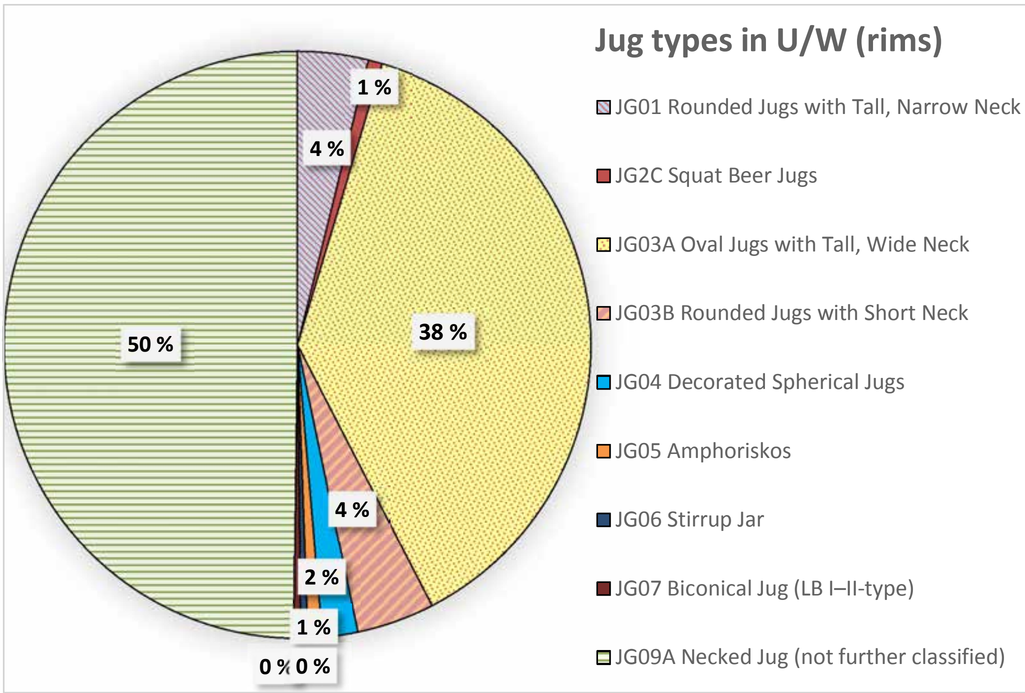


Fig. 5.100 Pie Chart of the jug types from the intensively retrieved areas U/W.

Type	Area U, local stratum								Total
	Name	U0	U1	U2	U3A	U3B	U4	U5	
JG01	Rounded Jugs with Tall, narrow neck	0	1	0	0	6	1	0	8
JG02C	Squat Beer Jugs	1	0	0	1	0	0	0	2
JG03A	Oval Jugs with Tall, Wide Neck	5	6	1	9	40	3	2	66
JG03B	Rounded Jugs with Short Neck	3	0	0	3	1	0	0	10
JG04	Decorated, Spherical Jugs	0	0	0	0	5	0	0	5
JG05	Amphoriskoi	0	0	0	0	1	0	0	1
JG06	Stirrup Jar	0	0	0	0	1	0	0	1
JG09A	Undefined Jug rims	30	10	11	19	33	0	0	103
JG09B	Undefined Jugs (body shards)	2	0	1	4	4	0	0	11
Total		41	17	13	36	94	4	2	207

Fig. 5.101 Distribution of the Jug types in area U, including rims and large fragments (at least half of the profile).

Type	Area W local stratum						Total
	Name	W0	W1	W2	W3	W4	
JG01	Rounded Jugs with Tall, narrow neck	0	1	2	0	0	3
JG03A	Oval Jugs with Tall, Wide Neck	13	4	10	3	1	31
JG03B	Rounded Jugs with Short Neck	1	0	0	0	0	1
JG06	Stirrup Jar	1	0	0	0	0	1
JG07	Biconical Jug (LB I–II-type)	0	0	0	1	0	1
JG09A	Undefined Jug rims	7	3	10	5	0	25
Total		22	8	22	9	1	62

Fig. 5.102 Distribution of the Jug types in area W.

Juglets

Juglets are small containers related to jugs in their form. They are usually 11–15 cm high and 6–10 cm wide. Illustrations are included in Appendix 5I, and details of size and surface treatments in Appendix 5L. Juglets are fairly uniform in their size. The capacities that I was able to measure varied between 12 and 25 cl (except for the small black juglet JL03 with a capacity of 5 cl). They have a rounded body, one handle and often a mouth suitable for pouring –characteristics in common with jugs. Though the name indicates a small jug, they differ from jugs not only in their size, but also in their more elongated body and pinched mouths, except for the Rounded juglets (JL01). They usually do not have bases that would enable them to stand on their own. They have one handle extending from the neck or rim to the shoulder. The mouth is usually around 2–3 cm wide. Juglets are generally well baked, attested by the color in the core being almost the same as on the surface. The walls are rather thin, usually 3.5–4.5 mm. Their small size as well as the inability to stand on their own indicate a function different from that of jugs. Throughout Israel-Palestine, these small vessels are found especially in burials and in cultic contexts. However, dipper juglets in particular are also relatively frequent in domestic contexts, as is the case at Tel Kinrot. There are 41 juglets from the Tel Kinrot excavations on the slope. There were 16 juglets in the material from areas U/W (6 %), 14 of which are rims or larger fragments. They are as common as each of the other small containers (flasks and pyxides). The counted flask shards are more numerous due to their easy recognition even within body shards. However, the rim frequencies are roughly the same.

JL01 Narrow Necked, Rounded Juglets

These rare juglets have a globular body and a handle extending from neck to shoulder. The neck is narrow and high, the rim part simple, and the mouth is only 20 mm wide. The handle runs from the neck to the shoulder. They are 13–15 cm high and the ca. 10 cm wide. They are of finer ware than other juglets, with less tempering material and no basalt used at all. They are divided into two sub types according to the base form.

JL01A Narrow Necked, Rounded Juglets with Flat Base

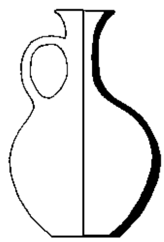


Fig. 5.103 Juglet 4273/1

Only one well preserved item has been assigned to this type, which starts to appear during Late Bronze Age I (Amiran 1969: 146) and continues at least until LB II and sporadically appears in the beginning of the Iron Age (see parallels below). The half of a juglet 4273/1 (Fig. 5.103) from the pit 3127 of the Foundation Phase (area H) has a high, narrow neck and everted rim (25 mm wide at the opening). The rounded handle is drawn from below the rim to the upper part of the shoulder. It is of fine gray ware and has no traces of surface treatment. It is 13.5 cm high and 9 cm wide, and has a flat base. Everted rim 10222/12 with a handle drawn from the rim and traces of burnish was found close to surface, but this small shard may originally derive from the Bronze Age. While the base is missing, I attributed it to this type because of the everted rim form. These juglets appear as predecessors for the Rounded Juglets with Rounded Base (JL01B).

Distribution:
Foundation Phase (constructional fill of): 4273/1.
Natural fill below the topsoil: 10222/12.

Parallels JL01A
The Jordan Rift Valley: **Dan,** Stratum VI: Ilan 1999: 91, Pl.49: 9. **Hazor,** Stratum 1B (Tomb 8065): Yadin 1960: Pl. CXXXIX: 11. **Tell Es-Sa'idiyeh** Tomb 101 of the early period: Pritchard 1980: 29, Fig. 3:4. **Pella,** Tomb 62: Smith & Potts 1992: Pl.58:2.

Jezreel Valley: **Megiddo,** Stratum VIA: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.11:1 (=Loud 1948: Pl. 75:9). Tombs 77 (Guy 1938: Pl. 41:23–24) and 1141 (Pl.49:4)

The Phoenician coast: **Tell Abu Hawam,** Stratum V: Hamilton 1935: jug no. 229. Stratum IV: ibid: Pl.XIV:169

Central Hill country: **Gezer,** Tombs 31, 58 and 84/85: Macalister 1911: 315, 322; 1912: Pl. LXXVI: 2, LXXXII: 9, LXXXVIII: 3–4. *Shephelah*: **Lachish,** Juglet types 776–777, Tomb 555, Group 1555: Tufnell 1958: 244, 273, Pl.77.

JL01B Narrow Necked, Rounded Juglets with Rounded Base


Fig. 5.104 Juglet 10699/1

These globular juglets with a round base have an upright neck and rim, and a handle drawn from the middle of the neck to the shoulder (Fig. 5.104). They are slightly larger than most juglets: 13.5–15 cm high and 9–10 cm wide at the maximum. The rim is 20–25 mm wide, simple and upright, and the section of the handle is flattened. Two vessels (6602/1, 7364/1) bear a pattern of gray/brown painted concentric circles that resembles those on the Iron I globular jugs (JG04) or flasks (below), and 7364/1 is also burnished. The form differs from the Jug JG04 in its slender neck part without a ridge in its middle, and the form of the handle. Fragment 10800/1 is lacking the base, but it is of the same size as the other items included in the type. Small rim fragment 14128/12 and the rim-neck 10310/4 have upright rim parts, narrow and tall neck and are therefore included in this type. However, the handle in 10310/4 is drawn from the rim and not from the neck. Parallels found for this type are few and not very close in their form. The tempering of the clay body is based on a variety of different minerals in small amounts and different particle sizes.

Distribution:
Foundation Phase: 14128/12.
Main Iron I Horizon: 6602/1, 7364/1.
Main Iron I Horizon, earlier phase: 10310/4 (rim only), 10699/1, 10800/1 (without base).

Parallels JL01B
The Phoenician Coast: **Tel Dor**, Ir1b horizon: Gilboa/Sharon/Zorn 2004: Fig.9:8.

The Philistine Coast: **ᶜIzbet Zartah**, Stratum III: Finkelstein 1986: Fig 8:14 (plain).

Central Hill Country: **Tell el-Far'ah (N)**, Level VIIb (pit II-242): Chambon 1984: Pl. 50:3–4. Small jugs with globular body, light slip and red painted circles, but neck missing. **Gezer**, Tomb 84/85: Macalister 1912: Pl. LXXXVIII: 4.

JL02 Dipper Juglets

The dipper juglets with elongated body appear in the Palestinian ceramic repertoire already during the Middle Bronze Age, and are relatively common in the Late Bronze Age (Mullins 2007: 434). The dipper juglet with a short neck and handle extending from rim to shoulder is a typical form for both Late Bronze Age II and the Early Iron Age. They are 11–17 cm high and 6–9 cm wide, and have rounded to tapering bases. I divided this group into three subtypes according to body shape, even though this division is problematic when sorting the shard material. The division was also loosely defined, and therefore somewhat artificial, between the Ovoid and Globular-bodied Dipper juglets (JL02A and JL02B). However, it seemed that there would be a difference in their chronological distributions at sites providing parallel material. The dipper juglet has been considered a utilitarian vessel used for scooping liquids from large containers like kraters for domestic purposes (Hunt 1987: 203; Gal & Alexandre 2000: 63). The placement of the handle, the relatively wide opening, and the pinched lip suitable for pouring support such a functional interpretation, though dry goods can be scooped as well. The clay is tempered with many small–medium sized basalt grits, and to a lesser extent with chalk or quartz.

JL02A Ovoid Dipper Juglets

These juglets (Fig. 5.105) have an ovoid body, tapering base, and a handle extending from rim to shoulder. The neck is rather short and the rim, when preserved, is pinched. The opening is 2–3 cm wide and 4–5 cm long in cross-section. The rim is simple and rounded. The handle runs from the rim to the sloping or rounded shoulder. These juglets are ca. 15 cm high and 6–8.5 cm wide. The clay is mid to light tempered, mainly with basalt and to some extent with other minerals. This is the most common juglet type at the site, and is also common in Israel-Palestine throughout the Late Bronze and Early Iron Ages.

Fig. 5.105 Juglet 10432/1

Distribution:
Stratum VII: 9394/1.
Foundation Phase: 7402/1; 12134/1 (W4)
Main Iron I Horizon: 7292/1, 7827/1, 8581/1, 8591/1, 8692/1, 8698/1, 9364/1, 14433/1.
Main Iron I Horizon, earlier phase: 10432/1.
Main Iron I Horizon, later phase: 12081/2 (W2).
Post-destruction Phase: 8049/1.

Parallels JL02A
Jordan Rift Valley: **Tel Dan,** (Type JT1a) Stratum VIIIA: Ben-Dov 2011: Figs.27: 12; 31:7. Stratum VI: Ilan 1999: 87–88, 91: Pl.60:5. Stratum V: ibid: Pl.1:6; Stratum IVB: ibid: Pl. 9:3. **Hazor,** Stratum 1: Yadin 1958: Pls. XCVI: 17; CXXVIII: 7–8. Stratum 1B: Yadin 1969: Pl. CCLXXV: 1–3. Stratum XII/XI: Yadin 1969: Pl. CCI: 25. **Tel Yin'am,** Stratum XIIB: Liebowitz 2003: 133, Figs.7:7–8; 10:7; 48:5. Stratum XII: ibid: Fig. 23:11; 29: 3. **Tel Beth Shean,** Level IXA: Mullins 2007: Pl. 78:10. Level VIII: James/McGovern 1993: Fig. 31: 4, 8. Level VII: ibid: Fig. 9:12; 13:8, 10–11; 22: 5–9, 11; 35:1; (N-4): Panitz-Cohen 2009: 254, Pls. 10:1; (S-3): 55: 1–2. Lower Level VI: James 1966: Fig. 22:20; 56: 8–9; (Stratum 4) Yadin/Geva 1986: 68, Figs. 27:8; (N-3b): Panitz-Cohen 2009: Pl. 13:14; (S-4): Panitz-Cohen 2009: Pl. 37:14. Late Level VI: James 1966: 52:23; 57:8; (Stratum 2): Yadin/Geva 1986: Fig. 9:1. Upper Level V: James 1966: 14:1. **Tel Eitun**, Stratum II: Gal 1979: Fig. 3:8. **Pella,** Phase IB: Smith/Pott 1992: Pl. 50:13 (base only). **Tell es-Sa'idiyeh** Tombs 105L and 119 the early period: Pritchard 1980: 29, Fig.9: 10; 24:3. Tomb 142 of the intermediate period: ibid: Fig. 42:2. Tomb 123 of the late period: ibid: Fig. 27:3. **Tell Deir 'Alla**, LB Sanctuary, Phase E1: Franken 1992: 4-27, 9. Phase E2: ibid: Fig.4-6:6–7. Phase E3: ibid: Fig. 4-9:27; 4-10:29, 32. Phase E4: ibid: Fig.4-15:24. Phase E6: ibid: Fig. 4-24:11. Phase E7: ibid: Fig. 5-3:12. **Jebel Nuzha** Tomb: Dornemann 1983: 33–34, Fig. 25: 15. **Madeba Tomb B**: ibid: Fig 25: 25.

Jezreel Valley: **Megiddo,** Stratum VIIB: Martin 2013: 390, Fig. 10.12:7. Stratum VIIA: Finkelstein/Zimhoni 2000: Fig. 10.9:2 (=Loud 1948 Pl.65:16); 10.11:1 (=Loud 1948: Pl.63:5); 10.13:7 (Loud 1948: Pl. 67:16); Arie 2013a: 508, 12.66:4. Stratum VIB: Finkelstein/Zimhoni/Kafri 2000: Fig.11.7:5 (=Loud 1948: Pl. 73:4); Arie 2006: 207, Fig. 13.51:13. Stratum VIA: Finkelstein/ Zimhoni/Kafri 2000: Fig.11.3:2; 11.11:2–3 (=Loud 1948: Pl.75: 15–16); 11.14:8–9 (=Loud 1948: Pl.75: 15–16); Arie 2006: 13.58:5; Arie 2013a: 508, Figs.12.79: 2–4; 12.89:1; 12.90:3. Stratum VB: ibid:

Fig. 11.26:1. Stratum VA–IVB: ibid: Fig. 11.33:6 (=Lamon/Shipton 1939: Pl.8:176). Stratum IVA: ibid: Figs.11.46: 1, 3; 11.56:2. Tombs 63 E (Guy 1938: Pl.62:16), 63F (Pl.63:14); 73 (Pl.65:23, 25–26), 911 A (Pl.30:8–9); 912 A1 (Pl.33:1–2); 912 D: (Pl.35:27); 989 A1 (Pl.16:26–28); 989 C1 (Pl.20:1); 1250 (Pl.67:5). **Tel Qiri,** Stratum IX: Ben-Tor/Portugali 1987: Fig. 20:7. Stratum VIII: ibid: Fig. 25:10; Hunt 1987: 203 – 204, Fig.40:15. **Yoqne'am,** Type JTIC: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 334. Stratum XVIII: Zarzecki-Peleg 2005: Fig.I.4:19. **Tell Dothan,** Phase 4/3: Master/Monson/Lass/ Pierce 2005: 96–99, Fig.10.55:11.

The Phoenician coast: **Tell Keisan**, Level 11: Puech 1980:228, Pl.81:5.Level 9c (pit 6067): ibid: 220, Pl. 71:4, 4a. **Tyre,** Juglet type 3: Bikai 1978: 42. Stratum XIII: ibid: Pls. XXXVII: 1; XXXIII: 18. **Sarepta,** Juglet J-4, Stratum E: Anderson 1988: Pl. 31: 22. Cemetery of **Joya**: Chapman 1972: 118, Fig.23: 226. **Dor,** Ir 1b–Ir1|2: Dipper juglet 2 (?): Gilboa/Sharon 2003: 28.

The Philistine Coast: **Tell Qasile,** Type JT 1, Stratum XII: Mazar 1985: 70, Figs. 11:24; 15:9. Stratum XI: ibid: Fig. 20:9; 30:16–18. Stratum X: ibid: Fig. 36:4–5; 42:2, 9, 43:23.

Central Hill country: **Tell el-Farah (N)**, Level VII b: Chambon 1984: Pl. 51:48, 50. **Gezer**, Stratum 6C: Dever 1986: 78–79, Pl. 19:15–16. Stratum 6A: ibid: 84, Pl. 28:3. Tomb 7: Macalister 1911: 306; 1912: LXIV: 8, 15, 21. Tomb 59: ibid: Pl. LXXIV: 9. *Shephelah*: **Lachish,** Dippers Class B, Tombs 527 and 559; pit 542: Tufnell 1958: Pl.78: 789–790.

JL02B Globular Dipper Juglets

Fig. 5.106 Juglet 10788/1

This juglet type (Fig. 5.106) is of the same size and proportions as the Ovoid Dipper juglet (JL02A). These juglets have a rounded, globular, but elongated and sometimes slightly cylindrical body with a relatively clear shoulder, rounded base, and a handle extending from rim to shoulder. The mouth is pinched or trefoil and the neck is short. The body form is between the ovoid form of most juglets and the irregular sack-shaped body that becomes more common during the Late Iron Age. The handle tends to be relatively thick, and the loop is small. The form differs from the ovoid dipper juglet only by degree. In general, the dipper juglets have a wide distribution both in time and space, from Late Bronze Age I to Iron Age II. There is a trend of the body becoming more globular or cylindrical during the Iron Age, but the body forms overlap in chronology.

Distribution:
Foundation Phase: -.
Main Iron I Horizon: 6696/1, 9598/1, 14381/1 (Locus 1835).
Main Iron I Horizon, earlier phase: 10492/1, 10424/1, 10788/1 (U3B).
Post-destruction Phase: 8046/1.
Later deposit (Iron Age?): 5026/15.

Parallels JL02B:
Kinneret, Stratum VI: Fritz 1990: Pl. 56:5. Stratum IV: ibid: Pl. 66:11; 96:10.

Galilee: Horbat Rosh Zayit, JT Ia, Stratum IIb: Gal/Alexandre 2000: 61, Fig. III.74:1. Stratum IIa: ibid: Fig.88:11.

Jordan Rift Valley: **Hazor,** Stratum 1B: Yadin 1958: XC: 9. Stratum Xb: Ben-Ami/Ben-Tor 2012: 430; Fig. 5.8:16 (=Fig.2.1:29). **Tell Hadar,** Stratum IV: Kochavi/Yadin, pers. comm. **Tel Beth Shean,** Pre-Level IX: Mullins 2007: Pl. 49:9–10. Level IXB: ibid: Pl. 60:8Level VIII: James/McGovern 1993: Fig. 31: 6, 9. Level VII: ibid: Fig. 9:12; 13:9. Lower Level VI: James 1966: 56:10; 57:6; (Stratum 3): Yadin/Geva 1986: Fig. 11:9; (Stratum 4): Fig. 27:7; (S-4): Panitz-Cohen 2009: Pl. 35:5; (S-3b): Pl. 45:12. Late Level VI (S-2): Panitz-Cohen 2009: Pl.72:4. Lower level V: James 1966: Fig. 3:7; 19:12, 18; 25:6; 26:6. Upper Level V: James 1966: Fig.7:4; 17.2; 31:30. Parts of Level V (S-1): Juglet type JT51: Mazar 2006: 367, Pls. 11:4, 12:6. Level IV: James 1966: Fig. 33:3. **Tel 'Amal,** Level III: Levy/Edelstein 1972: Fig. 13:8.Tel Rehov, Stratum VI: Mazar/Bruins/Panitz-Cohen/van der Plicht 2005: 220, Fig. 13.18:21. **Pella,** East Cemetery: Smith 1973: 212, Pl.42:137. **Tell Es-Sa'idiyeh**, Stratum V: Pritchard 1985: Fig. 11:4. Tomb 101 of the early period: Pritchard 1980: 29, Fig. 3:5. **Tell Deir 'Alla**, LB Sanctuary, Phase E-10: Franken 1992: Fig. 5-14:15. Iron Age habitation, Phase J: Franken 1969: Figs. 69: 7–8; 70:52.

Jezreel Valley: **Megiddo,** Stratum VIA: Arie 2006: 207, Fig.13.60:4; Finkelstein 2006: Fig. 15.1:6. Stratum VB: Arie 2013b: 704–705, Figs. 13.32:5; 13.37:3; 13.45: 1–2. Tomb 78: Guy 1939: Pl. 42:15. **Yoqne'am,** Juglet type IA/B: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 333. Stratum XVII: Zarzecki-Peleg 2005: Fig. I.28:9. Stratum XIV: ibid: Fig. I.44:14. **Taanach**, Period IB: Rast 1978: Fig. 11:17. Period IIA: ibid: Fig. 22:6. Period IIB: ibid: Fig. 40.9, 11; 62: 9–11.

The Phoenician coast: **Tell Keisan**, Level 9a: Briend 1980: Pls.61: 7, Level 8: ibid: Pl. 56:5–7. **Tell Abu Hawam**, Stratum IV: Hamilton 1935: 30, Jug 167. Stratum III: ibid: Juglet nos. 57–58. Stratum II: ibid: juglet no. 9.
Tyre, Juglet type 3: Bikai 1978: 42. Stratum XIV: ibid: Pl. XXXIX: 1–3. Pl. Stratum XIII: Pl. XXXIII: 17. Stratum X-2: ibid: Pl. XXV: 2–4. Stratum IX: ibid: Pl. XX: 5. **Sarepta**, Stratum D1: Anderson 1988: Pl. 33: 24. **Khirbet Silm, c**emetery**:** Chapman 1972: 117–118, Fig. 23: 91–92. **Dor**, Ir2a horizon: Gilboa/Sharon 2003: Fig. 13: 8.

The Philistine Coast: **Tell Qasile,** Type JT 2, Stratum XII: Mazar 1985: 70, Fig. 15:8. Stratum XI: ibid: 20:8, 10–11; 23: 17. Stratum X: ibid: Fig. 42:1, 3–6; 50:4. Stratum VIII: ibid: Fig. 55:9. All vessels are plain.

Central Hill country: **Tell el-Far'ah (N)**, Level VIIb: Chambon 1984: Pl. 51:41. Level d: ibid: pl.51:42. **Gezer**, Stratum 5C: Dever 1986: Pl. 35:8. Tomb 7: Macalister 1911: 306; idem 1912: Pl. LXIV: 12, 20; Tomb 28: ibid: Pl. LXXIII: 15. Tomb 59: ibid 322; 1912: LXXXIV: 4. *Shephelah*: **Lachish,** Level V: Zimhoni 2004: Fig.25.15:23. Tombs 216, 501, 503, 555: Tufnell 1958: Pl.78: 795, 798, 800, 301–302, 306 (Dipper classes C and D).

JL02C Dipper Juglets with Sack Shaped Body

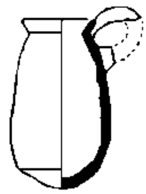


Fig. 5.107 Juglet 8512/3

There were four juglets with a sack-shaped body, with a wide lower part. However, they differ in details, and this small sub-type is heterogeneous. The body broadens towards the rounded base. The handle extends from the rim to the upper part of the shoulder. The handle on almost cylindrical juglet 8512/3 (Fig. 5.107) is high, extending above the rim. A peculiar fragment 8512/2 has a round lower part that is 9.5 cm wide and has a small knob at the base. While the upper part is missing, its identification as a dipper juglet can only be a tentative one. However, its size is that of a juglet. The whole juglet 4154/1 is very small, with a clearly rounded base and everted rim. Juglet 8592/1 has a pear-shaped body and a flaring neck, but the rim is missing. In its over-all shape it is very similar to the small juglet 4154/2. All juglets attributed into this group derive from destruction layers of the Early Iron Age. Three out of four are from two sealed rooms in area K (juglets 8512/2, 8512/3 and 8592/1) with several other well preserved small as well as large containers and some cooking pot fragments (Busch & Sasse: forthcoming). Sack-shaped juglets become the dominant juglet type during Iron Age II, but they make their first appearance already during Iron Age I (Mazar 2015: 17). However, most of the parallels derive from layers dated to Iron Age II.

<u>Distribution:</u>
Main Iron I Horizon: 4154/1, 8512/2 (?), 8512/3, 8592/1.

<u>Parallels JL02C:</u>
Kinneret, Stratum IIA: Fritz 1990: 68, Pl. 62:11.

Galilee: Horbat Rosh Zayit, area B (after Fort destruction): Gal/Alexandre 2000: 175, Fig.VI.13:14.

Jordan Rift Valley: **Hazor,** Stratum VIII: Garfinkel 1997: Fig. III.25: 1. Stratum VII: Yadin 1969: CLXXX: 15. Stratum V: Garfinkel 1997: Fig. III.44:7. **Tel Beth Shean,** Lower Level VI (Stratum 4): Yadin/Geva 1986:27:6. Late Level VI: James 1966: Fig. 52:11.

Jezreel Valley: **Megiddo**, Strata III–I: Lamon/Shipton 1939, Pl.1: 10–13. Tomb 29: Guy 1938:

Pl.68:6.

The Phoenician Coast: **Tyre,** Juglet types 1 and 2: Bikai 1978: Pl.CXIII:1–2. Stratum X-2: ibid: Pl. XXV: 1. **Sarepta,** Juglet types J-1A and 2. Stratum D: Anderson 1988: Pl.33:23. Stratum C: ibid: Pl. 37:2. **Khirbet Silm** and **Qrayé,** cemeteries: Chapman 1972: 117–118, Fig. 23: 86, 89 and juglets 283, 284.

Central Hill Country: **Gezer,** Tomb 59: Macalister 1912: Pl. LXXXIV: 6.

Philistine Coast: **Ashdod**, Stratum XII: Mazar 2015: pl. 1.1.24:11, 14.

JL03 Rounded Black Juglet


Fig. 5.108 Juglet 10042/1

The body is very globular, the rim is everted (not pinched or trefoil), and the handle runs from below the rim to the rounded shoulder. They are very small, 4.5 and 5.5 cm wide and 6 and 7 cm high, with a capacity of only 5 cl. The neck is ca. 2 cm high. The ware is dark grey and the surface has a dark, burnished slip. Two well preserved small juglets were found from the colluvium below the surface (4272/1 and 10042/1). Juglet 10042/1 (Fig. 5.108) derives from locus 9002, along with much restorable Iron Age pottery, but also shard material from diverse periods, indicating some disturbances within the context. Juglet 4272/1 derives from locus 3116, with little ceramics from various periods. While sharing characteristics of ware, size, body shape, and surface treatment, there are differences in detail between the two juglets. Juglet 4272/1 has a knob base, a flaring rim, and a high handle reminiscent of juglets of the Middle Bronze Age (e.g. Maier 2007: 276–277, Pl. 36:2), and the vessel may well derive from the earlier layers. However, the knob bases also appear during the Iron Age at other sites, such as Megiddo (Arie 2013b: 705, Fig. 13.42:7). Juglet 10042/1 has thick walls, a rounded base, and small, round handle. This kind of a small juglet has been considered a container, as opposed to the dipper juglet (Hunt 1987: 203–204; Gal & Alexandre 2000: 64).

The small black juglet seems to be typical for Iron Age II and especially for Iron Age IIB (Ben-Tor & Zarzecki-Peleg 2015: 144). A variation of black juglet with an elongated neck and handle running from neck to shoulder seems to be a slightly later development (Amiran 1969: 85; Mazar 2006: 369), appearing at Hazor stratum X (Ben-Ami & Ben-Tor 2012: 430), Megiddo VB–IVB (Arie 2013b: 705), and several tombs at Tell es-Sa'idiyeh (Pritchard 1980: e.g. Figs. 16: 2–3; 17:1). The absence of this variation at the slope may be chronologically significant. Most of the morphologically reminiscent small juglets from the Iron Age II layers at the acropolis of Tel Kinrot have light ware and red or pale slip, if any (Fritz 1990: Pl. 76: 13–18).

<u>Parallels JL03:</u>
Kinneret, Stratum IB: Fritz 1990: Pl. 76:19.

Galilee: Horbat Rosh Zayit, JT III, Stratum IIa: Gal/Alexandre 2000: 65, Fig. III.85:10.

Jordan Rift Valley: **Hazor,** Stratum X: Yadin 1969: Pl. CCVII:21 (rim and handle only). **Tel Beth Shean,** Upper Level V: James 1966:Fig. 6:9; 15:4. Parts of Level V (P-8): type JT54: Mazar 2006: 369–370: Pl. 22:14. Parts of Level V–Level IV (P-7): ibid: Pl. 41: 11–13.**Tell es-Sa'idiyeh**, Tomb 118 of the later period: Pritchard 1980:29, Fig. 23:6 (?). Stratum VI: Pritchard 1985: 79, Figs.7:1–4. Stratum V: ibid: Fig. 11: 8–10. **Jebel Nuzha** Tomb: Dornemann 1983: Fig. 26:1 (?).

Jezreel Valley: **Megiddo,** Stratum VIA: Arie 2006: 208, Fig.13.60:5. Stratum VB: Finkelstein/ Zimhoni/Kafri 2000: Fig.11.19: 10, 13. Stratum VA–IVB: ibid: 11.21:6.; 11.39:3–4; (H-5) Finkelstein 2006: Figs.15:5: 7–8. Stratum IVA: Finkelstein /Zimhoni/Kafri 2000: 316, Fig. 11:56: 3–4. Tomb 63F: Guy 1938: Pl. 63: 7–8 (?). **Tel Qiri,** Stratum V/VI: Ben-Tor/Portugali 1987: Fig.8:7; Hunt 1987:

203 – 204, Fig.40:18. **Yoqneʿam**, Type JTII, Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 334, Fig. II.45:4–5. Stratum XIII: Zarzecki-Peleg 2005: Fig. I.73:51.

The Phoenician Coast: **Khirbet Silm & Joya,** cemeteries: Chapman 1972: 142, Fig.30: 159, 263.

The Philistine Coast: **'Izbet Zartah,** Stratum I Silo: Finkelstein 1986: 89–91,Fig. 19:24.

Central Hill Country: **Tell el-Farah (N)**, Level VII b: Chambon 1984: Pl. 50: 12–13, 15. Level VII d: ibid: Pl. 50:9, 33. **Gezer,** Tomb 28: Macalister 1911: 312; idem 1912: Pl. LXXIII: 8.Tomb 31: ibid: 315; 1912: Pl.LXXVI:3. *Shephelah*: **Lachish**, Stratum III: Herzog & Singer-Avitz 2015:217, Pl. 2.4.17: 10.

JL04 Oval Juglet with Ring Base

The juglet 12022/1 (Fig. 5.109), found in the topsoil, has a globular body, ring base, and handle extending from neck to shoulder. There are red horizontal bands on the mid-body. This juglet closely resembles jug type JG01, and especially jug 8517/2, in its form, but it is of the size of a juglet. The juglet is 85 mm wide and preserved to a height of 130 mm (the rim is missing). Fragment 10538/4 of a narrow (25 mm), high, and upright neck is from the Main Iron I Horizon and has painted horizontal bands in red and black.

Fig. 5.109 Juglet 12022/1

Parallels JL04:

Galilee: **Tel Kabri**, area D: Lehmann 2002: Fig. 5.66:1.

Jordan Rift Valley: **Tel Dan,** Stratum IVB: Ilan 1999: Pl. 4:1. **Tell Zarʿa**, Phase IV.5: Dijkstra/Dijkstra/Vriezen 2009: Fig. 4.3.12. **Tell es-Sa'idiyeh** Tombs 102, 109S, 110, 139 and 141 of the early period: Pritchard 1980: 29, Figs. 5:4; 13:8; 14:3; 39:3; 41:2–3. **Tell Deir 'Alla,** Late Bronze Age Sanctuary, Phase E3: Franken 1992: Figs. 4-10: 34, 36–37. Phase E-4: ibid: 4-15:25. Phase E6: ibid: Fig.4-24:8. 5-14:17.

Jezreel Valley: **Megiddo**, Stratum VIA: Finkelstein/ Zimhoni/Kafri 2000: Fig.11.14:12 (=Loud 1948: Pl.75:11); Arie 2013a: 508, Fig.12.79:6. **Yoqne'am,** small jug type IIIA: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 322. Stratum XVII: Zarzecki-Peleg 2005: Fig. I.12:11. **Qashish,** Stratum VI: Ben-Tor/Bonfil 2003: 288, Fig.112:13 (The juglet is ca. 11 cm wide). T**aanach**, Cistern 74 (mostly Period IIB): Rast 1978: Fig. 62:13.

The Phoenician Coast: **Tell Abu Hawam**, Stratum III: Hamilton 1935: no 59. **Dor,** Ir2a horizon: Gilboa/Sharon 2003: Fig. 13:13 (=Gilboa 1999: Fig. 11:9) with bichrome decoration.

The Philistine Coast: **Tell Qasile**, Stratum X: Mazar 1985: Fig. 41:15 (only the lower part).

Central Hill Country: **Gezer**, Field I, Stratum 4: Dever 1970:Pl. 27:4. Field VI, Stratum 6A: Dever 1986: Pl26:9. *Shephelah*: **Lachish**, Level VIIA: Yannai 2004: 1050, Fig.19.25:12.

Flasks

Flasks are small closed vessels with a high and narrow opening (Fig. 5.110, Appendix 5J). In the Bronze and Iron Age Levant they typically have a lentoid or rounded body, two small handles, and upright necks (e.g. Amiran 1969: 166). This vessel type is often labelled "pilgrim flask" after the smaller, mold made flasks of round and flat shape, often bearing Christian symbols or blessing inscriptions, that were related to the pilgrimage tradition of late antiquity in and to Egypt and Palestine (Anderson 2004: 79–82; El-Din 2006). The larger form of the Iron Age flasks has been interpreted as a portable drinking vessel (Wampler 1947: pl. 94:4; Mandel 1988; Dayagi-Mendels 1999: 43).

Fig. 5.110 Flask 10834/1

Fig. 5.111 "Lower" side and interior wall of flask 10787/4 showing traces of wheel throwing

Fig. 5.112 "Upper" side detail of flask 10793/1

There are altogether 70 flasks from the Tel Kinrot excavations on the slope. Out of this total, 30 can be described well preserved (at least 1/3 of the vessel extant). There were 32 items identified as flasks within the intensively retrieved areas U/W, of which a majority were body shards, as the flasks are easy to recognize from the round, small body with painted decoration. There were only 12 rims/larger fragments, which is 0.6 % of the rims in these areas (U/W). I have divided the flasks into two main types according to the body form (lentoid or globular), even though the differentiation between the two body forms is fluid and somewhat arbitrary. In addition, I have created subtypes relating to the size and cup on the rim part. The capacities measured for the flasks vary from 13 to 25 ml for the smaller types, while the vessels of the large globular type reach double the volume of the small types (estimated by their outer dimensions).

It was previously assumed that flasks were made of two wheel-thrown bowls, attached to each other (Amiran 1969: 166; Mazar 1985: 71; Yadin & Geva 1986: 70). A manufacturing technique for creating the body in one piece was first suggested by Eriksson for the Late Bronze Age Cypriote flasks (1988; referred by Magrill & Middleton 2004: 2532). Glanzman and Fleming studied the Late Bronze Age flasks from Tel Beth Shean macroscopically and with xeroradiography, and concluded that the flasks were in fact thrown on a fast wheel in one piece (1993: 100–101). Based on a study on Late Bronze Age material from Lachish combining macroscopic observations, xerography, and experimental work by a professional potter, Magrill and Middleton suggested that the flasks were thrown in one piece (2004: 2532–2539). This technique for the Iron Age flasks was then also identified at Tel Beth Shean (Panitz-Cohen 2009: 256). This seems to also be the case at Tel Kinrot, where at least flasks 10787/4, 10793/1, 14277/1, and 14279/2 have a spiral in the middle and grooved interior wall on the "lower" part of the flask, indicating throwing on a fast wheel. This kind of spiral forms on the lower part and is also found on bowl bases (Fig. 5.111, cf. Glanzman & Fleming 1993: 101; Magrill & Middleton 2004: 2539, Fig.36.26:12). Flasks 10793 and 14279/2 have a raised "navel" indicative of the "upper" part being thrown on the wheel (Fig. 5.112; cf. Magrill & Middleton 2004: Fig. 36.26:11). Flask 10787/4 is the only flask with a groove along the mid-line on the interior wall (Fig. 5.113). The groove on the side may indicate a joining of two parts, while it may also be accidental. However, all other flasks lack such a groove. In many cases this may be coincidence, due to the fragmentary nature of the material and/or eroded inner surface. The flasks at Tel Kinrot are generally very symmetrical, though this is not dictated by manufacturing technique. The rather long and narrow neck was formed separately (on a wheel) and attached to a leather-hard vessel, and the two small loop handles were joined from neck to shoulder. The inner join of the neck is forcefully left unsmoothed (Fig. 5.114). Slip and painted decoration were often added to the vessel surface before firing. The exterior color is usually buff to reddish, while there is a slight variation in the interior surface as gray or buff. The clay material is strongly tempered with small particles of basalt, accompanied with smaller amounts of larger particles of chalk and/or quartz. The tempering sets seem to differ between the different body-forms. Approximately half of the vessels have a gray core and interior surface. This is especially common for the small globular flasks. Large globular flasks and the lentoid flasks are usually well baked, as indicated by the generally light color of the core.

Fig. 5.113 Side detail of Flask 10787/4

Fig. 5.114 Neck joining detail of Flask 10792/1

Most flasks have painted decoration with concentric circles. There are 17 flasks painted with red only (e.g. 5139/2, 10787/4, 10793/1), and as many flasks are painted with red and black/gray-brown (e.g. 5129/1, 5139/3, 7297/1, 8050/1), while gray-brown or black as the only color appears on 11 flasks (e.g. 7402/2, 12355/1). There are nine flasks that seem to lack decoration (5115/1, 6602/2, 7170/1, 7250/2, 7844/1, 8593/1, 9049/1, 14342/1, 14279/2), but the last examples are problematic: 14342/1 has a large part of the body missing and 14279/2 has a worn surface. Also, in other cases the original decoration might have been worn off. The decoration in red only is the most common pattern at several other sites such as Megiddo (Arie 2006: 222; Martin 2013: 396; Arie 2013a: 531, 534) or Yoqneᶜam (Zarzecki-Peleg et al. 2005: 337–339), and it tends to be an earlier decoration style than black and red decoration at several sites (Mazar 1985: 71; Zarzecki-Peleg et al. 2005: 339). At Dor, earlier flasks (Ir1a horizon) have red monochrome decoration and later flasks (Ir1b) have monochrome and bichrome decoration, the latter with wide red circles surrounded by thin black circles, a style labelled as *Phoenician* bichrome in order to distinguish it from other black and red painted decorations (Gilboa 1999: 2–5, 12; figs 1, 4, 10; Gilboa & Sharon 2003: Figs. 5:2–5; 9:7, 8, 10–14). A chronological trend from flasks decorated with red only towards a variety of surface treatments and decoration patterns also seems to take place at Tell Qasile (Mazar 1985: 71, Figs. 11:23; 20:12; 37:1 – 15; 42:12–16; 50:9–11, 19). No such pattern seems to occur at Tel Kinrot, where the decoration in one or two colors and the use of slip do not seem to make any consistent pattern with the body form, with each other, or with chronology. The width of the decoration lines is always the same. This is common to the Late Bronze Age tradition in the inland (Gilboa 1999), and seems to also be the case at Tel Dan, where surface treatments and decoration patterns do not seem to have a chronological relevance, but monochrome, bichrome, and plain flasks occur in the same strata (Ilan 1999: 91–92, e.g. Pls. 33:1; 52:8, 10).

Pale yellow or white slip has been observed on 14 vessels (both lentoid and globular flasks) and traces of red slip twice (on one lentoid and one globular flask). Traces of burnishing (by hand) were observed on a globular flask 14250/1 and on five neck- or body fragments. Not one slipped flask was also burnished, though this may be a coincidence due to the small amount and fragmentary nature of the material. During the Late Iron Age the flasks are commonly both red slipped and burnished. This is also the case at Tel Kinrot stratum II on the acropolis (Hübner 1990: 97, Pls. 75:10, 79:11; 80:8; 88:10). At Yoqneᶜam, the burnished flasks appear from stratum XVII on (Zarzecki-Peleg et al. 2005: 339). The occurrences of pale slip and monochrome decoration may indicate proximity to the Late Bronze Age tradition, while the co-occurrence of different decoration patterns is consistent with the late phase of Iron Age I.

Flasks are common in the sites on the northern Phoenician coast and in the valleys, less so in the Philistine sphere (except for Tell Qasile with its sanctuary), and rare in the central hill country – e.g. no flasks were published from Tell el Farᶜah phases VIIa–c (Chambon 1984) or Giloh (Mazar 1981), nor from Taanach (Rast 1978), and only one small fragment was published from Shiloh (Bunimowitz & Finkelstein 1993: Fig. 6.53:1). They are common in funerary deposits and cultic contexts (Hunt 1987: 205), while most of them derive from domestic contexts. At Tel Kinrot, flasks were often found together with other small containers (jugs, juglets, pyxides) and with lamps.

FL01A Lentoid Flasks with Simple Neck

The lentoid flasks (Fig. 5.115) have a lenticular cross-section of the body. These flasks are small: 8–12 cm wide and 12–15 cm high. The narrow neck is upright or slightly everted. The diameter of the mouth is 2–4 cm. The rim is simple or cut. These flasks usually have rather thin walls (3–4 mm). The rounded handles run from the mid-neck to above the mid-body. In most examples the joint of the handles is carefully smoothed, but in flask 7722/1 the attachment of the handles form relief petals common in the LB II, such as the flasks from the Mycenaean tomb at Tel Dan (Ben-Dov 2002: 76–77, Figs 2.50 and 2.60), tomb 8144

Fig. 5.115 Flask 11200/1

at Hazor (Yadin 1960: Pl. CXXX: 8–13) and tombs 912B, 71, and 72 at Megiddo (Guy 1938). Flask 11200/1 derives from a burial L9969 (the Main Iron I Horizon). Another lentoid flask was found in a trench on the eastern slope during construction work in 1991–92, and it also probably derives from a (disturbed) burial (Stepansky 1999). Lentoid flasks have also been found in cultic contexts, such as temple 131 at Tell Qasile (Mazar 1985: 71) or the temple of level VI at Tel Beth Shean (Fitzgerald 1930: 9; Pl. XLV: 2). Flask 12355/1 derives from a (probably) cultic context. According to residue analyses, this flask contained flavored oil (Nissinen & Münger 2009: 133). The lentoid flask is strongly rooted in the Late Bronze Age tradition, and has a wide distribution from LBII to the Early Iron Age, becoming less common during the course of the Iron Age. It is the dominant flask type at Tel Kinrot. There are several already from the Foundation Phase, though the total amount of pottery found from this phase was not very high. No lentoid flasks were recorded from the loci attributed to the Post-destruction Phase, although it may be a coincidence, as this phase had little material.

Twelve lentoid flasks have painted decoration of concentric circles on the body. Flask 7722/1 from the Foundation Phase is the only flask with circles alternating in red and black. Most Flasks have monochrome decoration, in red (10787/4, 10799/1, 10834/1, 11200/1, 12131/1) or brown/gray (5166/1, 7402/2, 9064/1, 12355/1). Three flasks have pale slip (5166/1, 6602/2, 12355/1), three bear traces of burnishing (7402/2, 12131/1, 14279/1) and three have no traces of surface treatment (5115/1, 7170/1, 7250/2) surviving. The clay body is strongly tempered with mainly small basalt inclusions, a few examples of mid-sized to coarse chalk particles, and occasionally small amounts of quartz. Macroscopically, the clay preparation seems to be similar with most other vessels at Tel Kinrot.

Three flasks could be described as semi-globular in body form, and thus on the border between the lentoid and globular flasks. They derive from the Foundation Phase (J2). Two of them are plain (7170/1, 7250/2) and one is painted with dark gray (7402/2). The flasks have an everted rim typical for the lentoid flasks, and therefore were assigned to this type (FL01A). These features have been taken into consideration in the parallels as well (though not all reports provide a side-view for the flasks). The examples most similar to Kinrot flasks are the parallels from Megiddo, with their similar size, decoration, and slender handles attached to the neck.

Distribution:
Foundation Phase: 7170/1, 7250/2, 7402/2, 7722/1.
Main Iron I Horizon: 5115/1, 5166/1, 6602/2, 7844/1, 9064/1.
Main Iron I Horizon, earlier phase: 10787/4, 10799/1, 10834/1.
Main Iron I Horizon, later phase: 11200/1, 12131/1, 12355/1, 14279/1, 14342/1.

Parallels FL01A:
The Jordan Rift Valley: **Tel Dan,** Stratum VII: Ben-Dov 2011:260–261, Fig. 43:2. Stratum VI: Ilan 1999 (Fl1): 91–92; Pls. 52:8; 53:4. Stratum V: ibid: Pls. 23:6; 31:10; 33:1. Stratum IVB: ibid: Pls. 8:8. **Hazor,** Stratum 1B: Yadin 1960: Pls. CXXX: 8–13; CXL: 5–6; (Tombs); CXLIII: 2–4. Stratum XII/XI: Yadin 1969: Pl. CLXVI: 13; Ben-Ami/Ben-Tor 2012: Fig.1.9:15. **Tel Yin'am,** Stratum XIIA: Liebowitz 2003:143, Fig. 47:7. **Tel Beth Shean,** Level VII: James/McGovern 1993: Fig.25:6. Level VI (early): James 1966: 23–26, Fig. 22:21; 50:9; 52:3, 53:21, 56:14; (=Stratum 4): Yadin/Geva 1986: 70, Figs. 27:12–13; (S-3a): Panitz-Cohen 2009: 258, Pl. 64:10–11 (type 71b). **Tell Es-Sa'idiyeh**

Tombs 109s of the early period: Pritchard 1980: 29, Fig. 13:9.Tomb 129 of the intermediate period: ibid: Fig.31:3. Tomb 123 of the late period: ibid: Fig. 27:2. **Tell Deir ᶜAlla,** Late Bronze Age Sanctuary, Phase E: Franken 1992: 28, Fig.3-7:11. Phase E6: ibid: Fig. 4-24:9. Phase F: ibid: Fig. 5-18:10; 5-19:14. Iron Age habitation: Franken 1969: Fig 46:8. Phase E: ibid: Pl.60:31 (body shards). **Tall al ᶜUmayri**, Phase 11A: Clark 2002: Fig.4.16:11, upper part only. **Madeba,** tomb A: Dornemann 1983:34, Fig. 30:17, 24–29, 31–32; Van der Steen 2004: Fig. 6-6:13–14.

Jezreel Valley: **Megiddo,** Stratum VIIA: Finkelstein/Zimhoni 2000: Fig. 10.11:8. Stratum VIB: Finkelstein/ Zimhoni/Kafri 2000: Fig. 11.1:3; 11.12:2; 11.15:2 (=Loud 1948: Pl. 80:5). Stratum VIA: Arie 2006 (type F1a-b): 208–209, Figs. 13.60:7–8; 13.63:18; 13.66:12–13; Finkelstein 2006: Fig.15.1:7–8. Tombs 17, 39, 71, 72, 76A, 912B and 1090A: Guy 1938: Pls. 34: 13–16; 70: 2–3, 5; 72: 3–7; 73: 8–9; 74: 14–15. **Yoqnᶜeam**, Type PFIA–C: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 337. Stratum XVIIIa: Zarzecki-Peleg 2005: Fig. 1.32:9. Stratum XVII: ibid: Fig. I.24:1; 28:10–11. **Tel Qashish,** Stratum I pit with mixed materials: Ben-Tor/Bonfil 2003: 358, Fig.141:15. **Tel Qiri**, Stratum VIIIB: Ben-Tor/Portugali 1987: Fig.14:2 (small, burnished bichrome flask from Stratum VIIIB is in Fig. 14 with Str. VII pottery for typological grounds, see pages XIX and XIII).

The Phoenician Coast: **Tell Keisan**, Level 9c (Pit 6067): Puech 1980: 220–221, Pls. 75:3, 6; 76:2–4n. Level 9a–b: Briend 1980: 209–210, Pl.62:1, 9–10. **Tell Abu Hawam,** Stratum V: Hamilton 1935: no.46Stratum IV: Pl. XIV: 157, 162, 166. Stratum III: ibid: Figs. 53–55. **Tell Jatt**, Tomb 7, Late Burial Phase: Yannai 2000: 59, Fig.11: 125–127. **Joya/Khirbet Silm,** cemeteries: Chapman 1972: 91–99, nos. 62–74; 197–208, Figs.12: 62, 197; 13: 63, 73; 14. **Tyre,** Stratum XVI: Bikai 1978: Pl. Pl. XLVIIA: 2-3 (neck-rim only). **Sarepta,** Stratum F: Anderson 1988: 213–215, Pl. 29:29; rim fragments from Strata G –E: ibid: Pls.28:16; 31:17. **Tel Dor**, Ir1a (late) horizon: Gilboa 1999: Fig.1:4, 6; Gilboa/Sharon 2003: Fig. 5:2, 4–5. Ir1b horizon: Gilboa 1999: Fig. 4:7–8; Gilboa/ Sharon 2003: Fig.9:7.

The Philistine Coast: **Tell Qasile,** Stratum XII: Mazar 1985: 71, Figs. 11:23; 15:10. Stratum XI: ibid: Fig 20:12, 14 (?). Stratum X: ibid: Figs. 37:2–6, 8–15; 42: 12–16, 50:11, 19. **ᶜIzbet Zartah**, Stratum III: Finkelstein 1986: 88, Figs.10:20; 13:5. Stratum II: ibid: Fig. 16:11. **Ashdod,** Stratum XII: Ben-Shlomo 2005: 116–117, Fig. 3.32:2–6. Stratum Xia: ibid: 158, Fig. 3.59:17.

Central Hill Country: **Shiloh,** Stratum V: Bunimovitz/Finkelstein 1993: Fig.6.53:1. **Bethel**, Iron I phase: Albright/Kelso 1968: 65; Pls.55: 14, 17; 61: 19/20. **Gezer,** Stratum 6: Dever 1986: 7–9, pl. 19:17. Stratum 5: ibid: pl. 38:1. Tombs 9, 59, 84/85: Macalister 1911: 308, 326–327; Fig.168; 1912: Pls. LXX: 7, 9, 11; LXXXIV: 12, 14; LXXXVII: 6; LXXXVIII: 5. **Tel Masos,** Stratum IIA: Fritz 1983: 88–89, Pl. 156:14, (from domestic context, with red circles). Stratum IIB: ibid, Pl. 159:7 (with red slip and black circles, from vicinity of the same house). **Tel Beit Mirsim,** phases C2 and B: Albright 1932: 41, 59–60, 73; Fig.10, Pls. 14:1-2; 21:53; 24:31-31; 25:30. *Shephelah*: **Timnah,** Stratum V: Panitz-Cohen 2006: 115–116, Pl. 74:16. Stratum VA, ibid: Pls. 4:12, 79:7.

FL01B Flasks with Extremely Lenticular Bodies

Fig. 5.116 Flask 10793/1

There are three extremely lenticular flasks from the Main Iron I Horizon. Although I defined the type according to the body form, there are other shared characteristics as well: they all have flaring rims, and the slender handles start immediately below the rim and are attached to the shoulder, creating larger loops than most of the flasks. They are only 5–6 cm thick at their cross-section, while they are 8.5–10 cm wide and 13.5–15 cm high, and their rim diameter is 4–5 cm. Flasks 8593/1 and 9049/1 have no traces of surface treatment, while the flask 10973/1 (Fig. 5.116) has faint traces of red slip (best visible below the rim) and wide red concentric circles on the body. The capacity of this flask was only 13 ml, and the other items are consistent with it as to their outer dimensions.

Distribution:

Main Iron I Horizon: 8593/1, 9049/1, 10793/1.

Parallels

Jordan Rift Valley: **Tel Beth Shean,** Level VII (N-4): Panitz-Cohen 2009: Pl. 9:4. **Tell Es-Sa'idiyeh,** Tomb 139 of the early period: Pritchard 1980: 28–29; Fig. 39: 6–7. Tomb 110 of the earlier period: ibid: Fig. 14: 4. **Tell Deir ᶜAlla,** Late Bronze Age Sanctuary, Phase E6: Franken 1992: Fig. 4-24:10.

Jezreel Valley: **Yoqnᶜeam**, Stratum XIV: Zarzecki-Peleg 2005: Fig. I.41:19. **Tel Qiri,** Stratum IX: Ben-Tor/ Portugali 1987: Fig.20:9.

The Phoenician coast: **Qrayé,** cemetery: Chapman 1972: 99–101, nos. 273–278, Fig.15. **Tyre,** Stratum XV: Bikai 1978: Pl. XLII: 2. **Tel Zeror**, beside Tomb 5: Ohata 1967: Pl. X: 11.

The Philistine coast: **Azor**, Tomb D30: Ben-Shlomo 2008: Fig. 19:9.

FL01C Lentoid Flasks with Spoon-Cup


Fig. 5.117 Flask 10792/1

Flask 10792/1 (Fig. 5.117), from a floor context (earlier phase of the Main Iron I horizon), has a spoon formed mouth. The cup is round and has a simple rim. It has red and black painted decoration, including horizontal bands and crossing stripes on the side, neck, and spoon in addition to the concentric circles on the body. Small knob handles are placed on the shoulder, typical for this variation at other sites, as well as for pyxides (see below). The flask is 130 mm wide, and thus slightly bigger than other lentoid flasks. The neck is short (25 mm) and thick (30 mm). A separate spoon was found in area J (7296/1). The clay is tempered strongly with small basalt inclusions and a few coarse chalk particles.

Parallels

Jordan Rift Valley: **Tel Beth Shean,** Level IV: Fitzgerald 1930: 13, pl. XLVII: 28 (east of the Temple Area). **Tel Rehov,** Stratum VII (D-4): Mazar/Bruins/Panitz-Cohen/van der Plicht 2005: Fig.13.7:16. **Pella,** Phase IA: Smith/Potts 1992: 88, Pl.51:12 (neck only).

Jezreel Valley: **Megiddo,** Stratum VIB: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.7:7 (=Loud 1948: 74:16); Arie 2006 (type F3): 13.51:14 (plain). Stratum VIA: Finkelstein/Zimhoni/Kafri 2000: Fig.11.11:10 (=Loud 1948: Pl. 80:7); Arie 2006: Figs. 13.58:713.60:9; 13.70:6; Arie 2013a: 510, Figs. 12.80: 3–4; 12.86:3. Tomb 39 (Guy 1938: Pl. 68:10). **Yoqnᶜeam**, Type PFII: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 339–340. Stratum XVIII: Zarzecki-Peleg 2005: Fig. 1.1:17. Stratum XVII: ibid: Fig. I.24:2.

The Phoenician coast: **Tell Keisan** Level 9a-b: Briend 1980: Pl.62:2, with red concentric circles and horizontal stripes on handles. **Tell Abu Hawam,** Stratum IV/III: Hamilton 1935: no. 161 Pl. XIV: 1.

The Philistine coast: **Tell Qasile,** Stratum XI: Mazar 1985: 74, Figs. 20:13, 30:19. Stratum X: ibid: Fig. 50:8. **Ashdod,** Stratum XI: Ben-Shlomo 2005: 158–160, Fig. 3.59:20.

Central Hill country: **Gezer,** Tombs 7, 9, 59 and 84/85: Macalister 1911: 304–306, 308, 326–327, 334–335; Fig.168; idem. 1912: Pls. LXV: 25, LXX: 8; LXXXV: 4; LXXXVII: 8. *Shephelah*: **Timnah**, Stratum VI–V: Panitz-Cohen 2006: 116–117, Pl. 65:9.

FL02A Small Globular Flasks


Fig. 5.118 Flask 14336/1

The small globular flasks are of the same width as the lentoid flasks: they are 9–10 cm wide, 8–10 cm in cross-section, and 13–15.5 cm high. The upright necks sometimes have a slight thickened ridge below the simple rim. Five globular flasks are from the Main Iron I Horizon. Flask 7297/1 has black and red painted decoration, flask 8495/1 has faint traces of concentric circles. Flask 14277/1 has black circles, and 14336/1

(Fig. 5.118) has brown. Flask 14279/2 has a worn surface with no decoration observed, but traces of pale slip could be discerned on the upper parts of the vessel. Globular flask 8050/1 is the only well preserved flask deriving from the Post-destruction Phase. It has black and red decoration and a ridged neck resembling the Phoenician style spherical jugs (JG04). The tempering of the clay is based on varied small mineral inclusions, and for flask 14279/2 with organic temper indicated by small elongated voids in the matrix. The almost whole flask 14336/1 had a capacity of 24 ml, and other small globular flasks are of the same size or slightly larger (flasks 8495/1 and 8050/1 are 1–2 cm wider and thicker in section). The globular flasks occur at fewer sites and in smaller quantities that the lentoid ones (Mazar 1985: 75–76). It tends to be slightly later, albeit the small amount of finds from stratified contexts precludes any firm conclusions. Interestingly, three out of six were found in area S loci 1779 and 1786.

Distribution
Main Iron I Horizon: 7297/1, 8495/1, 14277/1, 14279/2, 14336/1.
Post-Destruction Phase: 8050/1.

Parallels:
Jordan Rift Valley: **Hazor,** Stratum XII/XI: Yadin 1969: CCII: 2. **Tel Dan,** Stratum IVB: Ilan 1999: Pl.8:10.

Jezreel Valley: **Megiddo,** Stratum VIB: Finkelstein/Zimhoni/Kafri 2000: Fig.11.7:3 (=Loud 1948: 74:14), burnished. Stratum VIA: Arie 2006: 209–210, Fig.13.58:6.

The Phoenician Coast: **Tell Keisan**, Level 9a–b: Briend 1980: 209–210, Pl. 62: 11. **Tel Dor**, Ir1a (late) horizon: Gilboa/Sharon: Fig. 5:3.

The Philistine Coast: **Tell Qasile,** (FL 5b) Stratum X: Mazar 1985: 75–76, Figs. 37:7, 50:9, 10. No globular flasks appear in the catalogue of Strata XII–X.

FL02B Large Globular Flasks


Fig. 5.119 Flask 14330/1

There are five flasks that stand out because of their larger size and open mouths. These flasks are 16–25 cm wide, 14–23 cm in cross-section, and 21.5–34 cm high. They have a globular body and a flaring mouth. The rim is simple (5139/3), turned in (5139/2), or thickened inside (14430/1, Fig. 5.119). Most globular flasks have pale slip and are decorated with red circles (5139/2, 5172/1, 14430/1), and on flask 5139/3 in red and brown. Three decorated (5139/2, 5139/3, 5172/1) examples derive from the same locus 2050 in area G. One flask is plain and has a semi-globular body (7844/1), but it is of the same size with other flasks included in this type. The largest flask 5139/2 is already of the same size as the spherical decorated jugs (JG04). It is the only flask at Tel Kinrot that has an asymmetric body in cross-section. The clay of these flasks is tempered with varying amounts of mineral particles, mainly of basalt, chalk, and quartz. All large globular flasks derive from the Main Iron I Horizon. Parallel vessels have been published from a few sites only, mostly from the coastal sites.

Distribution

Main Iron I Horizon: 5139/2, 5139/3, 5172/1, 7844/1, 14430/1.

Parallels:

Jordan Rift Valley: **Tel Dan,** type Fl2, Stratum VI: Ben-Dov 2011:261, Fig. 91:2 (=Ilan 1999: Pl.52: 10).

South Syria: **Tel Afis**, Level 8–7a: Venturi 2000: 519; figs 7:16; 11:19.

The Phoenician Coast: **Tell Keisan**, Level 9c (Pit 6067): Puech 1980: 220–221, Pls. 74:1, 5; 75: 1–2, 4–5; 76:1.

The Philistine Coast: **Tell Qasile**, (FL 5a) Stratum X: Mazar 1985: 75, Fig. 36:8–9.

Central Hill Country: **Gezer**, Stratum 5: Dever 1986: Pl. 33:5.

FL03 Flask with Punctured Decoration

Fig. 5.120 Flask 12758/1

A flask fragment 12758/1 (locus 1722, area S) from the Main Iron I Horizon (earlier phase) has two parallel vertical grooves on the handle, surrounded by small impressed dots. There are also small holes at the ends of the grooves. There is a red diagonal stripe on the neck. The handle is small and rounded, like those of flask 7722/1, as is typical for the Late Bronze Age flasks (see above). The wall of the neck is thick. The thin grooves from the wheel throwing run in the direction indicative for a flask. Along with handle of a jug (?) formed as a female figurine 11831/1 from area R (L6619), this is the only handle with plastic and impressed decoration. No parallels were found for this item, however a small lentoid flask with punctured decoration has been found at Megiddo stratum VIA (Arie 2013a: 510).

Handle with Impressed Dots (Flask/Juglet)

Fig. 5.121 Handle 12749/1

A small handle fragment of a flask (or a juglet) 12749/1 derives from Main Iron I Horizon (L1728, also from area S). It is 23 mm wide and 7 mm thick, and has small pointed impressions on the outer face. An ovoid juglet with similar decoration derives from Qasile, stratum X (Mazar 1985: 70, Fig. 42:9), and punctured decoration on jugs, jars and pithoi occurs on several sites (Mazar 2015: 19).

FL01–2 Flask Fragments (not further classified)

Most of the flask fragments could not be classified to a certain type (Fig. 5.122). These fragments are either body shards or rim-neck fragments with upright and slightly everted rims. The rim is either 1.5–4 cm (seven fragments) or 6–9 cm wide (four rims), while there is a gap in the values between. While there are only eleven rims that could be measured, this may be coincidental. However, the narrow rims can be considered to belong to the smaller flasks (FL01 or FL02A), while the rims with a larger diameter might be of the large type FL02B. The body shards have concentric circles in red, or in black/brown and red. The thickness of the rim part is usually 3.5–5 mm, with one thicker example (8 mm). Two fragments derive from the Foundation Phase (5134/1, 5129/1). They include the rim, neck, and part of the body decorated in red and black. The majority of the flask fragments derive from stratified contexts of the Iron Age habitation layers. Most of them are from room 4301 and its adjacent courtyard (U3B), one of the clearest concentrations of flasks at the site (Fig. 5.123).

Distribution:
Foundation Phase: 5129/1, 5134/1.
Main Iron I Horizon: 10765/2, 10290/2, 10424/7, 10511/4, 10793/2 (not illustrated), 14395/1, 11055/18, 14279/3.
Later deposits: 11036/2, 11062/35, 11051/1.

Summary tables of flasks

	Intensive collected areas U & W		All other Areas
Type	Frequency	*Percent*	Frequency
FL01	7	*24.1*	15
FL02	0	*0*	11
FL01–2	22	*75.9*	12
Total	29	*100.0*	39

Fig. 5.122 Frequencies of Flask types.

		all shards		rims & large fragments
local phase		Frequency	*Percent*	
Area U	U-0	2	*6.8*	1
	U-2 (L4230)	1	*3.4*	
	U-3a (L4259)	1	*3.4*	
	U-3b	**17**	***58.5***	**9**
	Courtyard 4236	3	*10,3*	1
	Room 4301	11	*37,9*	7
	L4343: trench under floor in Room 4301 (U3b construction)	3	*10,3*	1
Area N	L4355 (contemporary with U3)	2	*6.8*	
Area W	W-0 (L5438)	1	*3,4*	
	W-2	4	*13.6*	2
	W-3 (L5406)	1	*3,4*	
Total		29	*100,0*	12

Fig. 5.123 Distribution of the flasks within the contexts at Tel Kinrot, from the intensively retrieved areas U/W.

	burnish	white Slip	red slip	painted decor	red only	grey-brown only	red and black paint
yes	4	3	1	19	8	5	6

Fig. 5.124 Observed surface treatments on flasks at Tel Kinrot, from the intensively retrieved areas U/W, n=29.

Pyxides

The term 'pyxis' is derived from Greek '*πυξός*', a box, and denotes small, cylindrical containers, often closed by a lid and made of different materials (Wicke 2008: 3). The term has a broad and varying meaning in classical Greek literature, where it came to mean an ointment box or women's cosmetic box during the Roman period (Milne 1939: 247, 251–252). Although the word is an anachronism, I use it here as it is an established term in the research history of the archaeology of Bronze and Iron Age Israel-Palestine, referring to a small, closed vessel more similar to a modern bottle than a box (e.g. Amiran 1969: 277).

The pyxis can be considered a straight-sided version of the Aegean alabastra, a closed shape including both cylindrical and conical parts (Furumark 1941: 39–45, Fig. 12). Such vessels appear in the Levant in the Late Bronze Age as Mycenaean imports (Leonard 1994: 35–39). The pyxis was soon integrated into the local pottery repertoire, and was developed independently from the Greek forms (Dothan 1982: 130–131; Yasur-Landau 2010: 243–244). The form disappears in the course of the Late Iron Age (Amiran 1969: 186). During Iron Age I, pyxides usually have a piriform or biconical body and a rounded, flat, or shallow ring base. The plain rim is often everted. Two pierced lug or ledge handles are horizontally attached to the vessels' shoulders. Following Late Bronze Age traditions, pyxides of the Early Iron Age are frequently decorated with painted bands, metopes, or zig-zag patterns in red, or red and black/brown (Amiran 1969: 277). At Tel Kinrot the red painted horizontal bands are the most common pattern. This small container with a narrow neck is 8–15 cm high and 9–11 cm wide. Their capacities vary between 20 and 30 ml, except for the smallest items with a capacity of only 10 ml (10357/1) up to the neck. Illustrations appear in Appendix 5K.

I have divided the rather heterogeneous group from the Early Iron Age horizon at Tel Kinrot into four types: piriform pyxis (PX01), biconical pyxis (PX02), cylindrical pyxis (PX03), and pyxis-bottle (PX04). The first three types present a continuum of the body shape, and the type boundaries are to some extent fluid. The distinctive pyxis-bottle (PX04) is rare. Common to all types is a strongly tempered clay body with small to medium sized basalt inclusions and few coarser chalk particles, while quartz is used occasionally. The pyxides are rather common in funerary deposits (e.g. Tufnell 1958: Pl.82; Hunt 1987: 205; Cooley & Pratico 1995: 154–158), but also appear in habitation loci (e.g. Ilan 1999: 29–33). Their contexts at Tel Kinrot are domestic, and they often appear together with other small containers.

PX01 Piriform Pyxides


Fig. 5.125 Pyxis 14445/1

These pyxides (Fig. 5.125) have a sharp carination close to the vessel's base but no clear shoulder. The resulting conical body is almost as wide at its maximum width (9–11.5 cm) as it is tall (9–12 cm). The upper part is often rounded. The simple or slightly thickened rim is upright (9652/1) or slightly flaring (all other rims). Most have a neck ca. 2 cm high. The mouth of the vessel is 3–4.5 cm wide. They have rounded or flat bases. The handles are usually small pierced upright knobs. The surface has no slip or burnish, and only two vessels of this type from Tel Kinrot have painted bands, one in red and black (9628/1) and one in reddish-brown only (12159/15, not illustrated). The pyxis 8575/1 aligns to this type in its general body shape, while its shallow disc base, 3 cm high neck, and horizontal lug handles are features typical for pyxides of the type PX02B.

Distribution:
Main Iron I Horizon: 6808/1, 8575/1, 9628/1, 9652/1, 10124/1, 12825/2, 12159/15, 14445/2.

Parallels:
Jordan Rift Valley: **Dan**, Stratum VI: Ilan 1999: 92, Pl. 56:13. Stratum V: ibid: 32:6; 42:2; 43:8 (=Biran 1994: Fig.103:2). Stratum IVB: ibid: Pl. 9:4 (=Biran 1994: Fig.104:6). **Hazor**, Stratum XII/XI: Yadin 1969: Pl. CCI: 26; Amiran 1989: 80; Garfinkel 1997: 223, Fig. III.20:8; Ben-Ami/Ben-Tor 2012: Fig.1.15:6. Stratum X: Garfinkel 1997: 223, Fig. III.21:21. **Tel Beth Shean,** Lower Level VI (S3b): Panitz-Cohen 2009, 262, Pl. 59:17; Fitzgerald 1930: Pl. 44: 22; Upper Level VI: James 1966: Fig. 50:3. **Tel Rehov**, D-4: Mazar et al. 2005: Fig. 13.7. **Tel Eitun**, Stratum II: Gal 1979: Fig. 3:9–10. **Umm ad-Dananir**, burial Cave B3: McGovern 1986: Fig.42:8. **Tell es-Sa'yidieh**, Tomb 101 of the early period: Pritchard 1980: Fig. 3:3; Tombs 105U, 118 and 144 of the later period: *ibid.* Figs. 8:2; 23:5; 44:1. **Tell Deir 'Alla**, Phase F: Franken 1992: Fig. 5-18:5; Phase E: Franken 1969: Fig. 59:110. Madaba Tomb B: Piccirillo 1975: 221, Fig. VII: 8.

Jezreel Valley: **Megiddo,** Stratum VIIB–A: Loud 1948: Pl. 68:7. Stratum VIB–A: ibid: Pl. 84:10, 12. Stratum VIA: ibid: Pl. 77:7; Arie 2013a: 511, Fig.12.79: 7, 11. **Tell Qiri**, Stratum VII: Ben-Tor/ Portugali 1987: 113, Fig. 24:3; **Ta'anach**, Period IIA: Rast 1978: Fig. 27:1. **Tell Dothan,** Western cemetery Tomb 1, Level 4: Cooley/Pratico 1995: Fig. 32:2.

Phoenician Coast: **Tell Keisan**, Level 9a: Briend 1980: Pl. 61:10. **Tell Abu Hawam**, Stratum III: Hamilton 1935: 7, 20, Figs. 11, 61. **Sarepta,** Stratum G1: Anderson 1988: 385–386, Pl.28:6.

Central Hill Country: **Tell el Far'ah (N)**, Level VIId: Chambon 1984: Pl. 60:21. Level VIIb: *ibid.* Pl. 60:13–14, 16–17. Level VIIa: *ibid.* Pl. 60:12.

PX02 Biconical Pyxides

This form has two carinations: one close to the vessel's base and another at the shoulder. The strength of the angles varies: vessels with a less pronounced shoulder are close to the piriform type. The upper carination is gentle, and the lower is sharper, though generally not as pronounced as in the piriform type. The lower angle presents the maximal width, while the shoulder remains smaller in diameter. The type can be subdivided into squat and tall vessels.

PX02A Squat Biconical Pyxides


Fig. 5.126 Pyxis 10609/1

These pyxides are short and wide. They are 9–9.5 cm high and 9–11.5 cm wide. The shoulder is rather indistinct, and some vessels have a rounded shape (7698/1, 8338/1, 12750/1). The neck is short (1–1.5 cm) and flaring, the rim is simple. The mouth is 4–5 cm wide. The lugs are usually small pierced knobs, upright or slanting up diagonally. The base is flat, disc, or rounded. Four vessels have red painted decoration, three (10609/1 in Fig. 5.126, 10620/2, 12126/6) have red horizontal bands only. Pyxis 8338/1 has a careless appearance to the painted red horizontal and diagonal bands, and radial stripes on the handle. A small pyxis 10357/1 has a pinched-in-body, and the upper part of pyxis 12756/3 seems to indicate such a body shape as well. Two fragments are preserved to the shoulder (12126/6, 12756/3), but as their necks are short and everted I have included them in this type. This is the only type that appears already in the Foundation Phase at Tel Kinrot, and also seems to be an earlier pyxis form at other sites.

Distribution:
Foundation Phase: 4832/1, 12126/6 (W4).
Main Iron I Horizon: 7698/1, 8338/1, 10357/1, 10609/1, 10620/2, 12756/3 (?).

Parallels:
Kinneret, constructional fill of Stratum IV: Fritz 1990: 39, Pl. 96:8.

Jordan Rift Valley: **Dan,** Stratum VIIA: Ben-Dov 2011: 261, Figs. 40:19; 41:14. Stratum VI: Ilan 1999: 92, Pls. 51:8, 52:11 (=Biran 1994: Fig.87:4; Ben-Dov 2011: Fig.91:1). Stratum V: ibid: Pls. 1:4, 7; 24:2; 28:9; 31: 2–3; 35:5; 39:9; 40:5; 43:3–4, 8. Stratum IVB: ibid: Pls. 7:4; 15:1; 17:12. **Hazor,** Stratum XII/XI: Yadin 1961: Pl. CCI:27–28; CCXXXVIII: 7. **Tel Yin'am,** Stratum XIIA: Liebowitz 2003: 143, Figs.12:6, 47:6. **Tel Beth Shean,** Level VIII: James/McGovern 1993: Fig. 18:9. Level VII: ibid: Figs. 25:4; 44:8, Lower Level V (Stratum 3): Yadin/Geva 1986: 34, Fig.11:10. Level V: Fitzgerald 1930: 35, Pl. 48:21. **Tell es-Sa'yidieh**, Tomb 136: Pritchard 1980: Fig.37:2. **Umm ad-Dananir**, burial Cave A4: McGovern 1986: Fig. 53:48. **Madeba Tomb A:** Dornemann 1983: 34, Fig. 30:14-15.

Jezreel Valley: **Megiddo,** Stratum VIIA: Finkelstein/Zimhoni 2000: Fig.10.11:5 (=Loud 1948: Pl.64:6).[17] Stratum VIB: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.7:2 (=Loud 1948: 73:12). Stratum VIA: Finkelstein/ Zimhoni/Kafri 2000: Figs.11.11:4; 11.14:6 (=Loud 1948: Pl.77: 9–10); Arie 2013a: 511, Fig.12.79: 8–10; 12.86:2. Tomb 911: Guy 1938: Pl. 30:12. **Afula,** Stratum IIIA-B: Amiran 1969: 277, photo 291, Capman 1972: 164. **Tell Qiri,** Strata IX, VIIC: Hunt 1987: Figs. 41:3–4, Ben-Tor/Portugali 1987: 103, Fig.20: 8. **Tell Dothan,** Western cemetery Tomb 1, level 4: Cooley & Pratico 1995: Fig. 32:5.

Phoenician Coast: **Tell Keisan**, Level 9c (pit 6067): Puech 1980: 225, Pl. 70:1–1f. **Tell Abu Hawam,** Stratum III: Hamilton 1932: 20, Figs. 60, 63. **Tyre,** Stratum XV: Bikai 1978: Pl. XLII: 18. **Khirbet Silm,** cemetery: Chapman 1972: 112, Fig. 22:84. **Dor,** type JG11 (Gilboa 2001, reference from Arie 2006).

Philistine Coast: **Tel Qasile,** Stratum XI: Mazar 1985: 77–78, Figs. 27:21; 30:20. Stratum X: ibid: Figs. 42:17; 50:18. Stratum IX: ibid: Fig. 52:7. **Azor,** Pyxis with pinched-in-body, Burial in area D: Dothan, T. 1982: 130, Pl. 38; Dothan, M. 1993: 128; Ben-Shlomo 2008: Fig.18: 10–11.

Central Hill Country: **Tell el Far'ah (N),** Level VIIa: Chambon 1984: Pl. 60:19. **Bethel,** Iron I Phase 1-2: Albright/Kelso 1968: 64, Pl.59:5. **Shiloh V,** Bunimowitz/Finkelstein 1993: Fig.6:50.

PX02B Tall Biconical Pyxides


Fig. 5.127 Pyxis 10758/1

This type is taller than the other types PX01, PX02A, and PX03. They are 12–15 cm high and 9–11 cm wide at the lower carination, which presents the maximum width. The neck is upright (12025/1, 12864/1) or slightly everted (8099/1, 10758/1, Fig. 5.127), relatively high (ca. 3 cm) and narrow, and widening towards the rim (2.5–4 cm). The rim is slightly everted. Lugs are typically ledges attached to the shoulder, and slanting up or almost horizontal. The narrow base is most commonly a disc or shallow ring base. Nine out of ten of these vessels are decorated with geometric patterns, most of all horizontal bands in red (4 items, see Appendix 5K), in black (once, 9255/1) or in red and black/gray-brown (4 items). The patterns include foremost horizontal bands, while other geometric patterns occasionally occur along with them: diagonal bands (7630/1, 12864/1), and one filled with dots (9255/1). Pyxis 8202/1 is plain. Pyxis 7630/1 is tall and high necked, but has a rounded base and small pierced knob handles, combining features of this

[17] =Locus 2131, has been re-stratified *with the help of the pottery* to stratum VIIA by Finkelstein & Zimhoni 2000: 234, while it was originally stratified as VIIB.

type and type PX01. I included the lower part of pyxis 10488/2 in this type even though its full form is unknown, as its base, width, and the remaining wall directions are similar with the other tall biconical pyxides.

Distribution:
Main Iron I Horizon: 8099/1, 8202/1, 9242/1, 9255/1, 10758/1, 12864/1, 12750/1, 10488/2 (red bands).
Post-destruction Phase: 7630/1,
Later phases: 12025/1 (red bands, W0).

Parallels:
Kinneret, constructional fill of Stratum IV: Fritz 1990: 39–40, Pl. 96:9 (red slipped).

Jordan Rift Valley: **Dan**, Stratum V: Ilan 1999: Pl. 37:1–2. **Beth Shean,** Level VII: Fitzgerald 1930: 23, Pl. 43:11.

Jezreel Valley: **Megiddo,** Stratum VIA: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.3:5; Loud 1948: Pl. 84:11.

Phoenician Coast: **Tell Abu Hawam,** Stratum III: Hamilton 1935: 20, Fig. 62, Stratum V: *ibid.* 40, Fig. 245. **Tell Keisan,** Levels 9a–9b: Briend 1980: 210; Pl. 61:13.

Philistine Coast: **Tel Qasile,** Stratum X: Mazar 1985: 77–78, Figs. 42:17, 50:18.

Central Hill Country: **Tell el Far'ah (N),** Level VIId: Chambon 1984: Pl. 60:18.

PX03 Cylindrical Pyxis

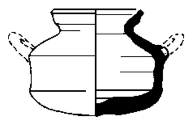


Fig. 5.128 Pyxis 7012/11

Plain pyxis 7012/1 (Fig. 5.128) from the Main Iron I Horizon has a cylindrical section: the shoulder and the flat base are of the same width. The upright slanting loop handles are attached to the shoulder, there is no neck, and the opening is wide and flaring. It is wide and squat compared with the other types: 7.5 cm high and 10 cm wide. The form is close to the Late Bronze Age II Aegean imported vessels (e.g. Leonard 1994: 36–37; Ben-Dov 2002). Pyxis 5169/1 has a slightly rounded cylindrical body. The shoulder is as wide (9.5 cm) as the lower carination near the vessel's flat disc base, which is only slightly smaller than the body in width. The item is 9.5 cm high and has a short, upright neck and simple rim. It is the only pyxis with pale slip, and in addition it has horizontal red and black bands.

Distribution:
Main Iron I Horizon: 5169/1, 7012/1.

Parallels:
Imported Mycenaean vessels from the close area (usually painted and slipped)*:* **Dan,** Mycenaean Tomb 387: Ben-Dov 2002:1902, Figs.2.71; 2.83. **Hazor,** Strata 2–1B: Yadin 1958: Pls. LXXXVI: 3; CXXXI: 9, 10.

Local products:
Jordan Rift Valley: **Hazor**, Stratum XII/XI: Ben-Ami/Ben-Tor 2012, Fig.1.6:12. **Tel Yin'am,** Stratum XIIB–A, Type 1: Liebowitz 2003: 142, Figs. 6:8, 29:9. **Tel Beth Shean**, Lower Level VI (S3b): Panitz-Cohen 2009, 262–263, Pl. 42:13. **Tell es-Sa'idiyeh,** Tomb 109: Pritchard 1980: Fig. 12:1, Tomb 116: *ibid.* Fig. 18:3, Tomb 143 *ibid.* Fig. 43:1. **Jebel Nuzha (Amman),** Tomb A: Dornemann 1983: 32–33, Fig. 30: 9–10.

Jezreel Valley: **Megiddo,** Tomb 63E: Guy 1938: Pl. 62:19. **Tell Dothan Western cemetery** Tomb 1, levels 5–2: Cooley & Pratico 1995: Figs.24: 1 – 2, 11, 28: 6, 10, 12, 32: 7, 35: 6.

Shephelah: **Timnah**, Stratum VII: Panitz-Cohen 2006: 117, Pl. 54:14.

PX04 Pyxis-Bottle

One vessel (14345/7, Fig. 5.129) from the Main Iron I Horizon (L1832) can be identified as a high, bottle formed vessel like the Philistine bottles described by Trude Dothan (1982: 160–168). The base is flat and the cylindrical body is ca. 15 cm high and 7.5–8 cm wide. The shoulder is pronounced and the neck is narrow (1–2 cm). The horizontal handle on the shoulder is a small raised ledge. The decoration consists of horizontal bands alternating in red and dark grey. The rim and parts of the body are missing. A small decorated body fragment with a distinctive angle to its shoulder (14401/1) from L1848 probably also belongs to a pyxis-bottle. The form is also found in tombs of the Late Cypriote IIIB or Cypro-Geometric period in Cyprus, where it seems to have its origin (Desborough 1964: 27, Pl. 16a and c).

Fig. 5.129 Pyxis-bottle 14345/7

<u>Parallels:</u>
Jordan Rift Valley: – .

Jezreel Valley: **Megiddo** Stratum VIIA: Loud 1948: Pls. 71:14–15. Stratum VIB: Loud 1948: 73:9. Stratum VIA: Arie 2006: 210, Fig. 13.70:3; Arie 2013a: 512, Figs. 12.79: 12–13. **Yoqne'am,** Stratum XVII: Zarzecki-Peleg & al. 2005: 343, II.48:8; photos II.44–45; Zarzecki-Peleg 2005: 29–30, photos I.23–25.

Phoenician Coast: **Tell Keisan,** Niveaux 9a–9b: Briend 1980: 210; Briend/Humbert 1980 Pl. 65:14. **Dor:** Gilboa 2001, reference from Arie 2006.

Philistine Coast: **Tel Qasile,** Stratum XII: Mazar 1985: 98–99, Fig. 17:6. Stratum XI: ibid. Figs.26:15; 30:22–23. **Azor,** Tomb: Dothan, M. 1993: 128.

Narrow Bases

Two small fragments of an unknown vessel seem to be of narrow, flat bases (9121/1, 9125/1). Such bases could belong to small containers, as the wall seems to be rather upright. However, similar bases do not occur within the well-preserved vessels, and thus their interpretation remains open. It is unclear if the fragment 6550/2 is a base or other fragment of a vessel.

5.2.6 Lamps

Lamps were relatively rare in the Tel Kinrot Iron Age assemblage: altogether 27 items could be defined as lamps. Lamps were produced as small rounded bowls, but the rim was pinched on one side in order to provide the wick of a lamp a stable position. Another method is to form a nozzle by turning the bowl rim in from two sides while the clay is still leather-hard. The lamps have a simple and rounded rim. The rim direction turns from everted to inverted at the part where the nozzle is formed. The rim on the other side of the lamp usually remains flaring. Therefore, a rim fragment of the back-side of a lamp might easily get confused with the rim of a flaring chalice. The bowls of the lamps tend to be shallower than the small bowls. Lamps have a rounded or flat base and the form is open except for the pinched nozzle. The lamps from Tel Kinrot generally do not have thick bases.

Traces of use (soot, blackening) can be identified mainly in the middle of the bowl interior and in the nozzle. In addition to their mundane use for lighting, the lamps seemingly have had a symbolic value, as they are a common artifact of temple and funerary deposits (see parallels section). All the Tel Kinrot lamps derive from domestic contexts. Illustrations are included in Appendix 5L.

Most lamps have a clay body characterized by many small–to–medium sized basalt inclusions and a lesser amount of medium–coarse sized chalk particles. The two wheel-made lamp types differ as to their rim shapes, type LP01 being simple and the lamps of type LP02 with long nozzles being flaring. It was suggested by Amiran that the less pronounced rim was more typical for Late Bronze Age II and Iron Age I, while the flanged rim form became more common during Iron Age II (1969: 291). The lamp types have been defined according to their rim forms at many other sites as well. However, the different rim forms seem to occur parallel with each other for a considerable time, e.g. at Tell Qasile (Mazar 1985: 78), Tel Beth Shean (Panitz-Cohen 2009: 260–262), and Tel Qiri (Hunt 1987: 204–205). In the limited assemblage of 24 lamps, it seems that the simple rimmed type dominates the Tel Kinrot assemblage throughout the Iron Age habitation. A peculiar phenomenon is the relative frequency of lamps formed without the use of the wheel, a practice seldom reported at other sites. Tel Kinrot lamps are generally flat with no emphasized flanged rims or bases. This tradition seems to continue at the site during the later phases of the Iron Age (Fritz 1990: 68; Hübner 1990: 97).

LP01 Simple Rimmed Lamps with Short, Wide Nozzle

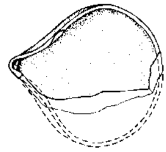


Fig. 5.130 lamp 4280/1

Three lamps from the fill of the Foundation Phase have short and wide nozzles, and thus represent the Middle Bronze Age II–Late Bronze Age I material culture at the site. The nozzle preserves less than one third of the bowl width. They are shallow, with a height of 4–5 cm. The only vessel with a full length almost preserved (4280/1, Fig. 5.130) is ca. 15 cm long from the nozzle to the opposite rim. This lamp has a thick base and its simple rim is turned up (see App. 5M). The two more fragmentary vessels seem to be smaller. One has a flat base and is probably handmade (6143/11), while the two better preserved vessels have rounded bases.

Distribution:
Foundation Phase (fill of): 4280/1, 4280/2, 6143/11.

Parallels:
Jordan Rift Valley: **Hazor**, Stratum 3: Yadin 1958: Pl. CXXII: 23; Cistern 7021: Pl. CXLII: 3. Stratum XIII: Yadin 1969: Pl. CLXIII: 13. **Tel Beth Shean**, Level XI (R-5b): Maier 2007: Fig.20:11. Construction Level IX: Mullins 2007: Fig.61:1, 4–6. Level VIII: James/McGovern 1993: Pl. 18:12. **Tell Deir ᶜAlla,** the Late Bronze Age Sanctuary, Hoard D539, Phase A: Franken 1992: Fig.7-1:4; Phase B: ibid: Fig. 7-5:1. **Um-ad-Dananir**, Burial Cave A2: McGovern 1986: Fig.20:1, 16. **Kamid el-Loz**, Layer 3: Slotta 1980: 37, 41, Pl.7:2–4.

Jezreel Valley: **Megiddo,** Stratum X: Gadot/Yasur-Landau/Ilan 2006: Fig.12.7:4.

Central Hill Country: **Shiloh,** Stratum VI: Bunimowitz/ Finkelstein 1993: Fig.6.37:9.

LP02A Broad Rimmed Lamp

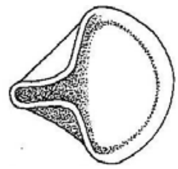


Fig. 5.131 lamp 9279/1

The three lamps with broad, flattened rims all have rounded bases and rather long pinched nozzles (Fig. 5.131). The rim is flaring and forms a slanted ledge of 10–15 mm. There is no angle below the flanged rim, nor can the ledge be described as horizontal, as during the later Iron Age, e.g. Hazor, strata VIII–IV (Ben-Ami et al. 2012: 445), and Tel Rehov, stratum V (Mazar et al. 2005: 229), but it opens up softly. The bowls are 14–17 cm long at their maximum (from the nozzle edge to the rim back). They are 4.5–6 cm high. The 7–8 cm long nozzle covers 2/5 of the bowl diameter, and the opening between the pinched rim sides is ca. 15 mm and is typical for Iron Age I, though it appears already in Late Bronze Age II. The bases are rounded.

Distribution:
Foundation Phase: -.
Main Iron I Horizon: 6787/1, 8452/1, 9279/1.
Main Iron I Horizon (Earlier phase): 10508/1 (not illustrated).

Parallels:
Tel Kinrot, Stratum IV: Fritz 1990: Pl. 99:11. Stratum IIA: ibid: 62:12. Stratum I: ibid: Pl. 68:14; 76:27.
Jordan Rift Valley: **Dan**, Stratum VIIB (Tomb 387): Ben-Dov 2002: Fig. 2.61: 72, 74–76. Stratum V: Ilan 1999: Pl. 32:7. **Hazor**, Stratum 1B (Tomb 8144–8145): Yadin 1960: Pl. CXXXV: 8; (Tomb 8065): CXXXIX:18. Stratum XII/XI: Ben-Ami/Ben-Tor 2012: Fig.1.2:13. Stratum Xa: Ben-Ami 2012: Fig. 2.13:16–17. Stratum IXB: Yadin 1969: Pl. CLXXVI:15. Stratum IXa: Ben-Ami 2012: Fig. 2.17:19. Stratum VI: Yadin 1969: CLXXXVII: 3, 5. Stratum Va: Sandhaus 2012: Fig.4.25:1. Stratum Vc: ibid: Fig. 4.31:17. **Tell Hadar**, Stratum IV: Kochavi/E. Yadin 2003 pers.comm. **Tel Beth Shean**, Level VIII: James/McGovern 1993: Fig. 32:5. Level VII (N-4): Panitz-Cohen 2009: Pl.2:10. Level VI (S-5): ibid: Pl. 24:16; (S-4) 31:2; 36:20. Lower Level V: James 1966: Figs. 29:3; 31:10; 50:14. **Pella**, Phase IB: Smith/Potts 1992: Pl.49:10. **Tell Deir ᶜAlla,** the Late Bronze Age Sanctuary, Phase E: Franken 1992: Fig. 3-7:6; E3: ibid: Fig.4-9:21; E5: ibid. Fig. 4-20:5; E7: ibid: Fig. 5-3:9; E8: ibid: Fig. 5-5:4. **Tell Deir ᶜAlla,** the Iron Age habitation, Phase A: Franken 1969: Fig. 45:12/15. Phase B: ibid: Fig. 48:35/37. Phase C: ibid: Fig. 53:16/17. Phase D: ibid: Fig. 56:11/13. Phase E: ibid: Fig. 58:22. Phase F: Fig. 61:10/11. **Um-ad-Dananir**, burial Cave 3B: McGovern 1986: Figs.43:3, 9; 44:2; 45:9; 46:1, 4. Cave A4: ibid: Figs. 54:52; 55:59. **Tell es-Saᶜidiyeh**, Stratum VII: Pritchard 1985: Fig. 1:21; 5:13–14. Stratum VI: ibid: Fig.7:31. Stratum V: ibid: Fig. 14:19. Tombs 109S and 137 of the earlier period: Pritchard 1980: 29, Figs. 13: 10–11; 38:2. Tomb 113 of the later period: ibid: Fig.16:5. **Tall**

al-ᶜUmayri, Phase 12: Herr 2000: Fig. 4.32:10–12. Phase 11: Herr 2000: Fig.3.10:11. Continuing in Lebanon as *Beqa'a valley:* **Kamid el-Loz**, Layer 3b: Hachmann/Miron 1980: Pl. 23:1.

Jezreel Valley: **Megiddo,** Stratum VIII: Loud 1948: 62:6 (=10.5:5 in Finkelstein/Zimhoni 2000). Stratum VIB: Loud 1948: Pl. 74:13 (for the safe loci, see Finkelstein/Zimhoni 2000: 240–242). Stratum VIA: Loud 1948: Pl. 79:8; Arie 2006: Fig.13.64:5; Arie 2013a: 527; Fig.12.86: 4–5. Stratum VB: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.18:16; 11.27:18, 11.31:7; 11.38:7 (=Lamon/Shipton 1939: Pl.38:19). Stratum IVA: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.56:7 (=Lamon/Shipton 1939: Pl.37:10). **Yoqneᶜam**, Stratum XVII: Zarzecki-Peleg 2005: Fig.I.9:6. Type I, common in Strata XVIII–XV: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 261. **Tel Qiri**, Stratum VII: Ben-Tor/Portugali 1987: Fig.24:6; Hunt 1987: 204–205.

Central Hill Country: **Tell el Far'ah**, Level VIId: Chambon 1984: Pl. 59: 8–9. VIIb: ibid: Pl. 59: 2–3. **Tell Dothan**, Tomb 1 (Western Cemetery): Levels 5–2: Cooley/Pratico 1995: 159–160, Figs. 35:9; 34:3; 31:5; 26:8.

Phoenician Coast: **Tell Keisan,** Level 9a–b: Briend 1980: Pl. 66: 15–16. Level 7: ibid: Pl. 51:11–12. **Tell Abu-Hawam**, Stratum IV: Hamilton 1935: Fig. 163. Stratum III: ibid: Fig. 92. **Tyre,** Stratum XVI: Bikai 1978: Pl. XLVIIA: 18. **Sarepta,** Stratum G1: Anderson 1988: Pl.28:10. Stratum F: ibid: Pl. 30:14. Stratum E: ibid: Pl.32:18. Joya/Khirbet Silm/Crayé: Chapman 1972: Fig.23:227, 285.

Philistine Coast: **Tell Qasile,** Stratum XI: Mazar 1985: Figs. 20:16, 18; 25:3; 31:5. Stratum X: ibid: Fig. 43:3. **Tell es-Safi,** Phase E4b: Gadot/Yasur-Landau/Uziel 2012: 249, Pl. 12.4:1. Probably also the lamps from Phases A5–A4: Zukerman 2012: 297.

LP02B Simple Rimmed Lamps with a Long Nozzle

Fig. 5.132 lamp 14410/1

The majority of the Tel Kinrot lamps are of the simple, plain rimmed type (Fig. 5.132). Rims are open and flaring, but do not display a flat horizontal flange. Bases are mainly rounded and slightly thickened. Three vessels (5153/1, 14410/1, 6660/1) have shallow disc bases, one of which is slightly concave (6660/1). The length of the bowls is 12–16 cm and they are shallow, with a height of ca. 5–6 cm. The nozzle covers one third of the bowl and the opening between the pinched rim sides is ca. 15–25 mm.

Distribution:
Main Iron I Horizon (Earlier phase): 10308/23 (not illustrated)
Main Iron I Horizon: 4280/1, 4280/2, 5153/1, 6660/1, 6701/2, 7247/11, 8191/1, 8212/1, 9604/2, 14367/2, 14410/1.
Main Iron I Horizon (Later phase): 10609/3 (not illustrated)
Post-destruction Phase: 7666/1.
Natural fill below the surface: 10231/4, 10242/6 (not illustrated).

Parallels:
Jordan Rift Valley: **Dan**, Stratum VIIB (Tomb 387): Ben-Dov 2002: Fig. 2.61: 71. Stratum VI: Ilan 1999: Pl. 54: 5. Stratum IVB: ibid: Pls. 13:4; 15:2. **Hazor**, Stratum 3: Yadin 1958: Pls. CXXII: 21–22; CXXV: 23–25; Cistern 7021: Pl. CXLII: 1. Stratum 1B: Yadin 1960: Pl. CXXIII: 1–3; (Tomb 8144–8145) CXXXV: 1–4; Yadin 1969: Pl. CCXCIII: 13. Stratum 1A: ibid: Pl. CCLXXXI: 14. **Tel Yin'am,** Stratum XIIB: Liebowitz 2003: Fig. 7:12. Stratum XII: ibid: Fig. 22:15. **Tel Beth Shean**, Level IXB: Mullins 2007: 439, Pl. 61:1, 6–7. Level VII: James/McGovern 1993: Fig. 26:6. Late Level VII: ibid: Fig. 52:2. Lower Level V: James 1966: Fig. 52: 12. **Tell Deir ᶜAlla,** the Late Bronze Age Sanctuary, Phase E4: Franken 1992: Fig. 4-14:8; E10: ibid: Fig. 5-13:6. **Tell Deir ᶜAlla,** the Iron Age habitation, Phase H: Franken

1969: Fig.68: 3. **Um-ad-Dananir**, burial Cave 3B: McGovern 1986: Fig.43:8; 44: 3–4. Continuing in Lebanon as *Beqa'a valley:* **Kamid el-Loz**, T2/T1: Penner 2006: Pl.28.

Jezreel Valley: **Megiddo,** Stratum IX: Gadot/Yasur-Landau/Ilan 2006: Fig.12.3:13–14. Stratum VIIB: Loud 1948: Pl. 66:9 (a641), 11. Stratum VIIA: Loud 1948: Pl. 66: 9 (c487), 11–13; 70:7 (=10.10:16–18; 10.12:9–10; 10.9:7 in Finkelstein/Zimhoni 2000). Stratum VIA: Loud 1948: Pl.79: 7, 9 (see also Finkelstein/Zimhoni 2000: 240–242); Arie 2013a: 527; Fig.12.89: 2, 5. Stratum IVA: Finkelstein/Zimhoni/Kafri 2000: Fig. 11.47:14.

Phoenician Coast: **Tell Abu-Hawam**, Stratum V: Hamilton 1935: Figs. 227, 300. Stratum III: ibid: Fig. 93. **Sarepta,** Stratum K: Anderson 1988: Pl.22:7.

Philistine Coast: **Tell Qasile,** Stratum XI: Mazar 1985: Fig. 20:17; Figs. 25: 1–2; 31:3. Stratum XI–X: ibid: Fig. 32:14.

LP03 Hand Formed lamps


Fig. 5.133 lamp 12840/1

There are two lamps that were formed without the wheel, as indicated by the uneven surface and lack of wheel-marks. They are small, flat based lamps with a simple, narrow rim similar to the type LP01 or LP02B. Lamp 9280/1 has a short and wide nozzle, while the lamp 12840 has a long nozzle. The small lamp 9280 is less than 9 cm wide and less than 3 cm high, while all the the lamp 12840 is of the same size as the wheel-made lamps (12 cm wide and 4.5 cm high). These two lamps may have been formed by pinching and other simple hand-forming techniques. The manufacturing technique reported for lamps is wheel-throwing for all lamps from the Beq'ah Valley (Glanzmann & Fleming 1993: 165, 170, 172), and both wheel-forming and mold-pressing at Tell Beth Shean (Panitz-Cohen 2009: 260). However, also wheel-thrown lamps portray finger impressions because of the forming of the nozzle after throwing on the wheel.

Distribution:
Main Iron I Horizon: 9280/1, 12840/1.

Parallels for the small, wide nozzled lamp 9280/1:
Jordan Rift Valley: **Dan,** MB IIB: Biran 1994: Fig.67:11.
Phoenician Coast: **Sarepta,** Stratum L: Anderson 1988: Pl.20:21. Stratum K: ibid: Pl.22:8.

5.2.7 Cylindrical Vessels: Stands and Pipes

Cylindrical vessels that are open at both ends have often been interpreted as stands. The form is close to that of drainage pipes, which are also ceramic, and their differentiation is difficult especially in cases with solid undecorated walls. Pipes can be identified with the help of preserved residue of water on the interior walls or with the help of their contexts, if found *in situ*, like one pipe (8723/1) from area K which was a part of the plastered installation L5247. Stands could have a flaring upper part to help a vessel to stand on it. However, such an opening might also be useful when a drainage pipe is constructed by setting several shorter parts one after another. The stands (or pipes) from Tel Kinrot derive from domestic contexts. There are altogether 32 vessels/vessel fragments identified as stands (or pipes). These vessels are strongly tempered with small basalt inclusions and, in a few examples, large particles of chalk. The illustrations appear in Appendix 5M.

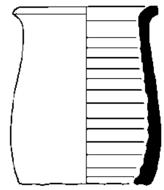


Fig. 5.134 Pipe 7790/1

ST01A Simple Stands/Pipes

This fairly uniform group of simple, rounded cylinders are about 15–18 cm high. The diameter of the opening is ca. 10–12 cm and the diameter at the lower end of the vessel is slightly less, ca. 9–10 cm. Wall thickness is ca. 8–12 mm. There are six vessels with their rim part preserved that have a flaring rim, while one item has an inverted mouth (7687/6). There were five items with their lowermost part preserved, and they all have a simple, straight, or slightly inverted opening at the base. Most of the items have a ribbed inner surface that could result from coiling as their building technique. On the other hand, there are thin horizontal lines running parallel to each other on the interior surface. This may imply a technique of at least finishing the vessel on the wheel. The size of the opening indicates that these standard-sized stands could not be used for heavy vessels like storage jars, but could serve as stands for jugs or lamps. Bowls at Tel Kinrot usually have flat, disc, or ring bases and would not need a stand.

Pipes are parts of drainage systems. Drainage pipes are longer than stands and sometimes handles are attached to their body. They might get confused with stands, or even with jars, when only fragments are analyzed. The opening of the drainage pipes more often seems to be inverted. The inner surface might have remains of chalk or other minerals present from drained water. A few items have a white or very pale interior surface (8723/1, 12120/12). Altogether the fragments that represent simple stands or drain pipes from Tel Kinrot number 21. It is noteworthy that the pipes derive from area K except for the few small fragments from other excavation areas. A group of seven very similar stands derives from locus 5281K (7719/1–6, 7790/1, Fig. 5.134) in area K. They are either to be assigned to the destruction of the Foundation Phase or to the constructional fill below the floor of the Main Iron I Horizon, as most of them derive from the uppermost levels in the locus. They were the only restorable ceramic vessels from this locus, despite there being many pottery shards from various periods. The context might support their interpretation as constructional drainage elements.

Most similar examples of their size and shape derive from the Tell Beth Shean Late Bronze Age temple (Mullins 2007: 439). Another group of stands of similar size derives from a casemate room at Hazor stratum VIII–VII (Yadin 1960: 9, 14). A group of drainage pipes from Late Bronze Age II Hazor (stratum 1) are of a similar width but have a closed upper part, and are clearly longer. The ribbed surface on the interior of the vessels is similar to the examples from Tel Kinrot, and to the drain pipes from Tel Beth Shean, level VIII (James & McGovern 1993: 77, Fig. 32: 7–9).

Distribution:
Foundation Phase: 7719/1–6, 7790/1.
Main Iron I Horizon: 7687/6 (pipe?), 7701/1 (pipe), 12120/12 (W2).
Post-destruction Phase: 8723/1 (drainage pipe with chalky interior surface).

Parallels:
Jordan Rift Valley: **Dan**, Stratum IX: Biran 1994: Fig. 68: 13. **Hazor**, Stratum 3: Yadin 1960: Pl. CXV: 26. Stratum 1: Yadin 1958: Pl. CXXXI: 13; Yadin 1960: Pl. CXLVII: 7–9. Stratum 1A: Yadin 1969: Pl. CCXCV: 22. Stratum XIII: Yadin 1969: Pl. CLIX: 37; CC:13. Stratum IXa: Ben-Ami 2012: Fig. 2.21:12. Stratum VIII/VII: Yadin 1960: Pl. LXII: 6–8. **Tel Beth Shean**, Pre-Level IX (R-2): Mullins 2007: 439, Pls. 40: 11; 43: 1–8. Level IXB (R-1b): ibid: Pls. 66: 18; 69:8. Level VIII: James/McGovern 1993: Fig.32:6. Level VI (S4–3b): Panitz-Cohen 2009: Pls. 28:7; 45:13.

Jezreel Valley: **Megiddo,** Stratum X: Loud 1948: Pl. 47:17; 55:17–18. Stratum VII: ibid: Pls. 67:6; 70:13. Stratum IVA (H-3): Finkelstein/Zimhoni/ Kafri 2000: Fig. 11.53:9.

Central Hill Country: **Shiloh,** Stratum VII: Bunimowitz/ Finkelstein 1993: Fig. 6.22:6.

ST01B Stands (or Pipes) with Plastic Decoration

Two small body fragments showing a cylindrical shape (11819/1 and 10382/1, Fig. 5.135) have plastic, applied decoration with incised diagonal strokes and punctuations, comparable to the tall decorated stands interpreted as cult stands from Late Bronze and Early Iron Age Hazor, which also have similar plastic applied decoration (Epstein & Dothan 1989: 238–239, 255–256, 271), or the stands with windows from Megiddo (Arie 2006: 218) or Tell Qasile (Mazar 1980: 87–96). It is noteworthy that vessels interpreted as incense stands from area H, stratum 2 at Hazor, with both windows and raised, incised reliefs were found as a part of a drainage channel. At that time this was interpreted as reuse of the items (Epstein & Dothan 1989: 238).

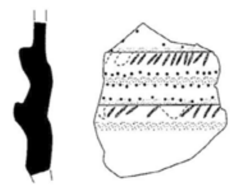


Fig. 5.135 Stand 10382/1

Distribution:
Surface: 10382/1.
Locus 6619: 11819/1

Parallels:
Jordan Rift Valley: **Hazor**, Stratum 2: Yadin 1969: CCLXVIII: 1–4. Stratum 1B: ibid: CCLXXXVI: 11, 13–16. Stratum 1A: CCLXXXII: 5. Stratum XI. Yadin 1969: Pls. CCIV: 2.

ST03 Thick Rimmed Stands


Fig. 5.136 Stand 12158/3

Cylindrical, thick walled, and wide stands form a clearly distinctive though rare group, numbering six vessels only. The walls are over 20 mm thick and the rim is thickened (over 30 mm), as is the lower end of the vessel. The profiles are rather straight. The size of the thick stands varies considerably: vessel 10951/1 has a diameter estimated at 160 mm, while a diameter of one large stand (10848/6) seems to be over 60 cm. The height can be measured for a one item only: the incised stand profile (12158/3, Fig. 5.136) is 22 cm high. At least three of the thick stands have rounded holes below the rim, ca. 10–20 mm in diameter. The whole profile of stand 12158/3 has an incised ibex, one rounded hole in the middle of the body, and three smaller holes in a row below the thick rim (50 mm). The diameter of the stand is ca. 30 cm. The vessel was published by Pakkala et al. (2004: 23, Fig. 12). A similar ibex incised on a pithos was published from Ḥorvat ʿAvot (Braun 2015: 39). Low and thick walled cylindrical stands from Tell Qasile derive from Shrine 300 (Mazar 1980: 96). The comparable stand fragments from Tel Beth Shean are fragmentary (Panitz-Cohen 2009: 263–264). The interpretation of these vessels as stands remains unattested.

<u>Distribution</u>:
Foundation Phase: -.
Main Iron I Horizon, earlier phase: 10848/6 (U3B).
Main Iron I Horizon, later phase: 10951/1, 10972/4, 12069/1, 12158/3 (incised ibex).
Post-destruction Phase: 12181/1 (W1).

<u>Parallels</u>:
Jordan Rift Valley: **Hazor**, Stratum 2: Yadin 1969: Pl. CCLXVII: 15–16. Stratum 1: Yadin 1960: Pl. CXLVII: 1–2. Stratum 1B: Yadin 1969: Pl. CCLXXVI: 5, 9. Stratum 1A: ibid: Pl. CCLXXXII: 2. Stratum XII/XI: ibid: Pl. CLXIX: 17. **Tel Beth Shean**, Level VII: James/McGovern 1993: Fig 45: 6. Level VI (S-4): Panitz-Cohen 2009: Pl. 31:6; (S-3): Pls. 48:7; 55:5. Upper Level VI: James 1966: Fig. 53:14. Lower Level V: James 1966: Fig. 26:16.

Jezreel Valley: **Megiddo,** Stratum VIIA: Arie 2013a: 526, Fig.12.65:4. Unstratified: ibid: Fig. 12.69:5. Tomb 912: Guy 1938: Pl.35:20. Tomb 37: ibid: Pl. 38:30. **Yoqneᶜam**, Stratum XVII: Zarzecki-Peleg 2005: Fig. I.24:4.

Philistine Coast: **Tel Qasile**, Stratum XI–X: Mazar 1985: Fig. 32:12. Stratum X: ibid: Fig. 45:1.

5.2.8 Varia

While I have defined most groups in the typology according by an assumed function or shared features, this is not the case with this last group of various pottery items found in small numbers. Illustrations are included in Appendix 5N.

Strainer/Sieve

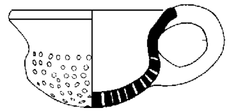


Fig. 5.137 Strainer cup 7316/1

One example of a fully preserved strainer is a cup-like small bowl with small incised holes covering the lower part of the cup, and one loop handle. The rim is flaring and rounded. The diameter at the opening is ca. 8.5 cm and the height of the vessel is ca. 5 cm. The wall thickness is ca. 5 mm. The vessel derives from the Main Iron I Horizon. Based on funerary deposits of bronze vessels, it has been suggested that the cup-like strainer is a part of a set together with a juglet and a bowl (Pritchard 1980: 11–12, Figs. 4: 15 – 18; 47; 49:1; 50:7; Negbi 1974: 163–164). A similar set with a shallow strainer was identified in Egypt already during the Late Bronze Age, and it has been connected with wine drinking (Dayagi-Mendels 1999: 55 and Fig. on p. 56; see also p. 36 for a strainer and jug found together at Shiloh).

<u>Parallels:</u>
Jordan Rift Valley: **Hazor**, Stratum XII/XI: Yadin 1969: CLXX: 20 (without a handle). **Tel Bet Shean**, Late Level VII: James/McGovern 1993: Fig. 52:4.

Jezreel Valley: **Megiddo,** Stratum VI: Loud 1948: Pl. 70:4; 78:16; 85: 8–9; Arie 2013a: 528, Fig. 12.80: 6–7. **Yoqne'am**, Stratum XV: Zarzecki-Peleg 2005: Fig. I.49:29.

Central Hill Country: **Shiloh,** Stratum V: Bunimowitz/ Finkelstein 1993: Fig.6.47:6.

Philistine Coast: **Tel Qasile,** Stratum XI: Mazar 1985: Fig 31:11. **Tell es-Safi,** Phase post-A5: Zukerman 2012: Pl.13.6:14. Phase A4: ibid: 13.14:16.

Funnel

Fig. 5.138 Funnel 12817/1

There is one seemingly fully preserved vessel with a narrow, thick, handmade cylinder-formed stem and a widening end, showing traces of wheel working. The whole item derives from the Main Iron I Horizon. The vessel is 11.5 cm high and the upper part is open and simple. The opening is 8.6 cm wide and the lower end is 5.5 cm wide. The general form resembles that of a chalice foot, but the vessel has thicker walls (1–1.5 cm) than chalice feet. The stem has clear finger impressions, indicating that it was not thrown on the wheel as the chalice feet were, and there are no traces of joining a bowl on the other end. Two narrow handmade cylinder-formed objects are probably from similar vessels, as jugs with high and narrow necks are usually wheel made. I consider them to be funnels. Some items interpreted as small stands may actually be funnels, such as the examples from Megiddo stratum VIIB (Mario 2013: 393, Fig. 10.21:10) and stratum VIIA (Loud 1948: Pl. 70:13).

<u>Distribution</u>:
Main Iron I Horizon: 12817/1.
Post-destruction Phase: 7637/2, 7715/1.

<u>Parallels</u>

Jordan Rift Valley: **Hazor**, Stratum 1B: Yadin 1960: Pl. CXXIII: 21. Stratum XII/XI (pit): Yadin 1969: Pl. CCII: 18. **Tel Yin'am,** Stratum XII: Liebowitz 2003: Fig. 12:7. Stratum XIIA: ibid: Fig. 28:8. Stratum VIB: Liebowitz 1979: Fig. 6:9. **Pella,** Trench XXXIIF, Phase 6–5: Bourke/Sparks/McLaren/Sowada/Mairs/Meadows/Hikade/Reade 2003: Fig. 16:16.

Jezreel Valley: **Megiddo,** Stratum VI: Arie 2013a: 528, fig 12.47:FU1.

Philistine Coast: **Tell Qasile**, Stratum XI: Mazar 1985: Fig. 31:12.

Basins

No basins were found fully preserved at Kinneret. A few examples have a full profile on one side, but while the vessels were hand-built by coiling and probably of slabs, the full form remains unknown when only fragments are preserved. The bases preserved were flat. The ware is coarse and usually strongly tempered with basalt, and sometimes also with little-medium sized particles of chalk. Occasionally organic temper could be recognized from the small elongated voids in the fresh cut matrix. Walls are at least 1 cm thick, and the rim part is simple and somewhat rounded. The diameter is hard to estimate when only the rim part is preserved, but in any case the vessels were wide, the diameter often exceeding 50 cm. The vessels were often not well baked, leaving much grey in the matrix. They might have served for washing, as they were rather shallow and wide, as were the washing vessels in the first half of the 20th century in Palestine (Dalman 1964: 234, Illustration 105b). These coarse, hand-made vessels or installations might in fragmentary form be confused with tabun-fragments (two fragmentary tabuns are included in Appendix 5O in order to illustrate this affinity, even though I have not included them in the typology). Most of the basin parts seem to be rounded. However, rim parts do not always show clear rounding. This might be due to the large size of the basins and the method of constructing these large vessels without a wheel.

Distribution:
Main Iron I Horizon: 5114/1 (L2050)
Post-destruction Phase: 7683/1, 8055/1.

Parallels:
Jordan Rift Valley: **Hazor**, Stratum XIII: Yadin 1969: Pl. CLIX: 38.

Jezreel Valley: **Megiddo**, unstratified: Arie 2013a: 528, Fig. 12.95:3. **Yoqne'am,** Stratum XII: Zarzecki-Peleg/Cohen-Anidjar/Ben-Tor 2005: 344, Fig. II. 48:15.

Vats/Molds


Fig. 5.139 Vessel 10951/1

There are two coarse and handmade vessels of unknown function. The better preserved example (10951/1) is from locus 4348. The height of the well preserved item is 9.8 cm and its diameter is 16 cm. The walls are 25–35 mm thick. It is a hand formed, rounded, roughly shaped, flat-based vessel with two ca. 25 mm wide holes near to its base on opposing sides. The inner surface has some darker spots, probably indicating contact with fire, or they might result from conditions of the soil. The fragment 6463/1 is broken at the base, but the preserved form and size is very similar to the better preserved vessel. Rim fragments of such items would not differ from those of basins (above), and might get confused with tabun fragments as well. The vessels might be interpreted as molds used for some sort of domestic food production. Two thick and shallow vessels with a similar placement of a (broken off) spout have been published from the Megiddo tombs of the Late Bronze Age (Guy 1938: Pls. 37:7, 49:22, 57:2).

<u>Distribution:</u>
Main Iron I Horizon: 10951/1.
Natural fill below the surface: 6463/1.

Lids/Stoppers

There is one item that was originally formed as a lid (8691/1), deriving from the Main Iron I Horizon. The 6.5 cm wide round clay disc has a small handle in the middle. There are several lids or stoppers that portray secondary use of ring bases or body shards of pottery. They are mostly 4–8 cm in diameter, while a few were bigger, 10–15 cm in diameter. The size fits the opening of the larger jugs (JG03A, JG03B) and the most common storage jars (SJ02 and SJ03).

Fenestrated Vessel/Shrine Model

Fig. 5.140 Fenestrated vessel 10103/1

This is a peculiar vessel combining the characteristics of a jar and a krater. Two items have been found in the Main Iron I Horizon (6603/2, 10103/2). Its specific form probably indicates a specific function as well. The lower part resembles a krater with a ring base, while the rather high body resembles a jar, but the uppermost part is closed. It has a rectangular opening on its side, flanged by two loop handles. Two door fragments were found in the same area, though not in the immediate context. The vessel, its function and distribution, concentrating on the Jordan Rift Valley, have been discussed by Nissinen & Münger (2009). Kletter has discussed cult stands in general (2010). A detailed study by Hava Katz (2006, in Hebrew) includes a type of round, closed models (summarized by Kletter 2010: 31–32). A comparable fenestrated vessel from Tall Zira'a Stratum 13 (IAI) has slightly tapering uppermost part (Häser et al. 2016: Fig.7)

Unknown Clay Objects/Maracas

Fig. 5.141 Objects 10104/1, 10142/1 and 10149/1

Three straight handles with an upper part formed like a small bowl. There are small incised/drilled holes near the rim of the bowl. The handles are 6–11.5 cm high and 2.8–3.6 cm in diameter. The bowl diameter is 5.6–5.9 cm. They might be interpreted as feet for maracas. The small holes would serve for mounting the dried shell of a gourd to the foot. The items all derive from two neighboring Main Iron I Horizon loci, 9010 and 9012, in area T, which had many restorable pottery vessels. The item 10104/1 was found intact. Item 10149/1 is broken on the lower part and heavily burned, and 10142/1 has cracks in the bowl part and spots of traces of contact with fire. Item 10142/1 was found inside a wide carinated bowl (10140/1). In the same corner of in room 9010 as item 10104/1, there were dozens of small snails that could have functioned as sound-making elements.

5.2.9 Reflection on the Process

Making a typology seemed to me an easy and straightforward task in the beginning, while afterwards it appears to me as a complex and vexing process filled with subjective and intuitive decisions and few facts. What I found most difficult was to establish borders between types that seemed somehow close, and could be described as "fuzzy" distinctions. Borders are in many ways artificial, but I still needed them in order to create types that would be homogeneous within themselves. While classifying borderline cases I needed to make judgements about which features would be more important for the type distinctions than others. Would the diameter and thickness of the wall be more important than the ware descriptions? And if so, why? In addition to the borderline cases, there were items that seemed to me anomalous altogether. The borderline cases lie in the gray zone between two or more types that are usually somehow close to each other. The anomalous cases did not fit any type. While it may seem clear to which type they are the closest, they still remain strangers amongst their closest companions. Both cases are far from the heart of their respective type. It was always an uncomfortable decision to create a type or subtype for an item that was a lonely outrider. Still, I created such types: e.g. the bowl with distinctive decoration (12030/1) or three loop feet (12024/1): features that were unique at Tel Kinrot but for which there were comparative items from other sites, where they were singled out as unique items as well.

Much of the typological descriptions would have been similar if the material studied was retrieved by an informal strategy and comprised of an assemblage of mainly well preserved vessels. However, all frequencies of vessel classes or types, as well as counted statistics like ranges or means of measured features (diameter, wall thickness), can be considered valid only because of the intensive retrieval strategy. When dividing rounded bowls into types or inverted kraters into sub-types, I made use of the distribution of the rim diameter, in addition to other details that were patterned with the rim diameter.

As I was uncomfortable with the fluid nature of many types, I wanted to use simple quantitative features for defining types. I wanted these features to be measurable for a major part of the material. The simplicity was motivated by reasons of working economy, but also because simple measuring is less prone to mistakes than a more complicated one (Fish 1978). I also used features that could only be defined from well preserved vessels, such as height or maximum width. However, such features were useless for the bulk of material that had to be sorted: the shards. Within the traditional typology I was able to provide a thorough treatment for the well preserved items, even the single occurrences. At the same time, I felt that the bulk of the material was to some extent under-utilized. In order to study this mass of material, I turned to statistics for help. I wished to gain insights that would be useful in the typology creation process by using features that I had been able to measure from the large amount of material available to me. Most especially, I wished to obtain the means to assess and even to correct the difficult type designations and "fuzzy" type borders. I also expected that such a change in perspective would provide me with tools to evaluate the process and results of the typological classification.

5.3 Statistical Approach

5.3.1 Quantitative Analysis and Statistical Tools Used

The use of statistical tools for defining types is essentially heuristic – as are the traditional, more intuitive ways of typological work as well. The benefit of using statistical tools is the possibility of detecting small scale patterning that would be impossible to discern intuitively from the material. Another benefit is the consistent treatment of the material, enabling the repeating of the analyses. It also makes it easy to check how observed features and typological assignations fit together, whether the patterns are constant in different sub-sets of the material, or whether similar patterning can be detected at other sites as well. As a result, statistical analyses can be used *to confirm the intuitive typological groups – or, if the patterning is weak, to provide a reason for reconsidering them*. Statistical analyses enable one to test one's intuitive conclusions, and the patterns that one is inclined to see. They provide tools to check if the observed patterns are significant, or if it is fairly likely that there are no real differences but only random variations. The typological focus of my statistical analyses is a direct result of my interest in the typological method as such. I think that statistically constant patterning can enhance the typology by making it more robust and less dependent on intuition alone. Chronological differences within the Tel Kinrot material will be examined in section 5.3.3.4. However, the amount of material is for many vessel classes too small to allow for adequate statistical testing. Statistical comparisons between sites must wait for comparable databases of different sites that do not exist.

Most pottery classifications – including the one for the Tel Kinrot ceramics– are based on ware and/or form characteristics (Rice 1987: 286; Pfälzner 1995: 9). In addition, there are distinctive surface treatments that have been used to define some wares together with distinctive ware, such as "Chocolate-on-white ware", "White ware", or the "Tell el-Yahudiye ware" of the Middle and Late Bronze Ages) (e.g. Maier 2007: 286; Mullins 2009: 398), or the "Philistine" ware (Dothan 1982) of the Early Iron Age, identified by its decoration and some specific vessel forms. In Israel-Palestine, the form has in general been the main criterion in typologies (see above), with the exception of cooking pots identified by their distinctive ware. This is also the case in the Tel Kinrot ceramic typology in section 5.2 above. The ware descriptions do accompany the illustrations of the vessels, but the ware descriptions remain under-exploited in most typologies. This is probably at least partially because the parallels have been actively discussed and the clays as well as the tempers are presumably local, while the form has been a feature that one can link to other sites. Macroscopic clay descriptions, as well as an evaluation of the potter's technique, have been included in the typologies of Deir ʿAlla by Franken (1969) and in the typology of the Late Bronze Age Pottery from Lachish (Yannai 2004). However, the material from Lachish was not statistically sound, and therefore quantitative analysis was made only for the gross estimation of frequencies of different vessel types (Yannai 2004: 1056–1059).

In the process of pottery manufacture, clay preparation is done before building the vessel (as the second step after procuring the materials). However, the features of clay are commonly treated separately from vessel form, in separate sections within the typology or as separate chapters, or even as an appendix. The ware is analyzed by specialists in petrography, as at Timnah (Mazar & Panitz-Cohen 2001: 15–24) and Tel Beth Shean (Cohen-Weinberger 2007), or through chemical analyses. The latter are most commonly carried out by INAA (Instrumental Neutron Activation Analysis), such as the analyses at Qiri (Sharon et al. 1987), Gezer (Hughes & Smith 1986), and Tel Beth Shean (Maier & Yellin 2007). However, such analyses are always performed on only a small fraction of the material, while the vast majority is described with the help of a magnifying glass or the naked eye only (Mazar & Panitz-Cohen 2001: 15; Bourriau 1990: 20*). It is customary in the analysis of the chemical composition of vessels to use multidimensional statistical analyses (e.g. Sharon & Yellin 1987: 229–235; Arnold et al. 1991; Gomez et al. 2002; Forster et al. 2011; Goren et al 2011). Even though the macroscopic observations made by the naked eye on wares are not as secure and exact as the petrographic or chemical analyses, the same statistical tools can be used. The macroscopic observations can be analyzed together with other recorded features of form and surface treatment for all the material, while the petrographic or chemical analyses can be examined using a relatively small sample only. I wanted to step further away from the descriptive summary statistics, and proceed towards looking for significant associations between recorded features, using modelling and testing hypotheses such as confirming or rejecting an assumption of difference between materials from different stratigraphic phases. I also wished to obtain confirmation for the created vessel types, or the means to refine the typology. Using these tools, I could assess the strength of associations between features that I had intuitively considered important while creating the typology.

In an ideal situation, a quantitative study begins with formulating a research question, and then selecting the material to be studied and features to be measured based on the assumption that the features are significant for the research question. In practice, archaeological projects may often collect data without a clear plan of how to relate the observed details to the overall research questions (Orton 2000: 10–11). I chose the variables to measure by relying both on tradition and the restrictions created by the fragmentary nature of the material, combined with a wish that the features I was able to measure would be meaningfully linked with the production techniques of the potter, indicative of cultural transmission, contacts, and/or dating. I have used R software (version 3.0.2) for the analyses included in this section.

The table in Fig. 5.142 sums up the originally measured variables and their measuring techniques. For the selection of what and how to record, see section 5.1. The variables are arranged according to their level of measurement. Categorical variables are measured on a nominal scale, which means that the classifications do not have an order, while the variables with an ordinal scale can be meaningfully ordered, although the distances between the values are not equal. Only the variables that relate to size can be measured on a ratio scale.

Categorical variables					
Obj_no find number of the item	Locus find context of the item	Area excavation area	Ware ware types like 10=cooking ware 11=basalt and chalk tempering	Type coding for vessel types, first types based on drawings; extended during the work (104 types)	Rim rim type coding (form & direction, 68 types)

Temp_m Main tempering material*	Tem2_m Second tempering material*	Techn forming technique 0= wheelmade (has traces of wheel throwing) 1=hand made 2=unclear	burnish 0=no 1= on rim only 2=yes	Slip 0=no 1= on rim only 2=yes 3= uneven on the exterior (EB-style)	Decor 0=no 1=yes

color_cor color in the middle of the fresh cut matrix according to Munsell Soil Color Chart (MSCC)	color_ex Main color on the exterior surface according to MSCC	color_in Main color on the interior surface according to MSCC	Slip_col & Dec_col colors of slip and painted decoration (according to MSCC)

Variables measured with ordinal scale			
Pres preservation 0=body shard, 1=rim shard, 2=large fragment (e.g. from rim to shoulder) 3=(almost) whole vessel, at least whole profile	Firing hardness of the item 1=unbaked/very brittle 2=brittle 3 medium 4=hard 5= very hard 6= unknown	Period estimated period 1=Neolithic 2= chalcolithic 3 – 7: EB Periods 9= MBIIA 10=MB IIA-B 11=MB IIB 12=MBIIB-LBI 13=LBI 14=LBI-II	15=LBII 16=LBII–Iron I 17=Iron I 18=Iron I–II 19=Iron IIA 20=Iron IIB 21=Iron IIC … 33=UD –early 34=UD late 35= not datable 36=unknown
Temp_q 0=no temper 1=very little 2=little 3=medium 4=much	Temp_s 0=no temper 1=small 2=medium 3=coarse	Tem2_q 0=no temper 1=very little 2=little 3=medium 4=much	Tem2_s 0=no temper 1=small 2=medium 3=coarse

Numeric variables measured on ratio scale				
Diam Diameter of the rim (measured from the inner side). In case of small 50 % preserved vessels with slide caliper, for shards estimated with the help of drawn circles	Rim_max maximum thickness of the lip	R_min minimum thickness of the lip	Low_r thickness of the lower thickening (some rim types)	Bel_r thickness of the wall below the rim
	All rim thickness-related variables were measured with slide caliper in 0.1 mm			

Fig. 5.142 Table with features recorded for the pottery analysis. *Tempering materials: 0=no temper; 1=basalt; 2=quartz; 3=chalk; 4=flint; 5=dark minerals; 6=sand (mixed minerals); 7=red grits; 8=organic; 9=unknown.

In addition to the originally measured variables, I created several new variables by splitting or combining the original categorical variables. I combined vessel types of the same functionally defined group into a variable of (vessel) class (like bowls, jars, or cooking pots). I split the information about the rim type, which originally included both the direction of the rim and the form, into two categorical variables: the first including the direction of the rim part (everted, inverted, or upright), and the second including the form. I also combined some of the rare and relatively similar rim forms. I made the original color coding according to the Munsell Soil Color Chart, comparing the shard with the colors on the sheets of this widely used booklet (edition 2000). Later, I converted the three-folded coding into three variables that could be considered as ordinal scaled variables of darkness (from dark to light), brightness (from greyish to bright tones), and hue (from greenish to reddish and yellowish hues). I made the conversion with the help of the rows, columns, and sheets, which were ordered according to these facets of color (MSCC 2000: 1–3).

There is a host of statistical analyses developed for various purposes that can be used in archaeology. I have chosen a few that seemed to enable useful insights from different perspectives. I used *factor analyses* (FA) in order to trace associations between measured variables. FA is a descriptive and heuristic method. It is used in order to trace features that co-vary and could be interpreted as reflecting some background factor (like technical facilities, preparation of clay, or function of a vessel group). A great number of attributes can thus be reduced to a few factors, and the screening of the material made easier. This enabled me to assess the reliability of the measurement model (Fig. 2.6) that I used as an interpretative key, between the features observed on the pottery shards and their possible causes relating to manufacture and chronology. The results also helped to evaluate the usefulness of the measured variables, as some of them (e.g. colors) are closely related, and one can leave some measured variables (e.g. color of the inner surface) away without a relevant loss of information. While FA works best with variables measured on a ratio scale, I use *correspondence analysis (CA)* and *multiple correspondence analysis (MCA)* in order to trace the patterning in categorical variables, as they are suitable methods for such types of data. CA makes it easier to “see” different features in a map-like picture, and thus discover features that constantly, from different perspectives, are close to or far from each other.

As I wanted to evaluate the typological classification, I also included statistical classification, for which I used discriminant analysis. Groups and types are often the focus of archaeological research, and archaeologists have used many classification methods on them, most commonly *hierarchic cluster analysis* (Shennan 1997: 220 – 221, 234–253). This method is convenient for clustering observations (items with many measured variables, such as pottery shards) when the amount of items to classify is not large. However, it becomes unwieldy as the number of observations grow (Hair et al. 1998: 477). For larger data sets, other methods have proven more insightful, such as *discriminant analysis*. Another weakness in hierarchic clustering applications which result in different trees (dendrograms) is their linear nature, with results proceeding in one direction. The method easily obscures similarities between groups, such as similar rim forms in different vessel categories.

5.3.2 Descriptive Statistics, Single and Pairwise Inspections

Creating descriptive summary data of the distribution of the values of single variables, and a pairwise inspection of two or more variables, are always taken as the first steps in analyzing quantitative studies. This means calculating different statistics of the assemblage, and more importantly those of the different sub-assemblages, such as means, most common values (modes), dispersion (variability), and co-occurrences between different variables. Even more important than the counted numeric statistics are the usually graphic presentations of the data, which often provide better access to single variable distributions when drawn as bar charts, curves, or box-plots, and are especially important for the graphic inspection of the relationships between variables.

The analysis of missing values in the recorded observations is a necessary step in the beginning phases of quantitative analysis. Of the 37 variables measured from the observed pottery items, some were more often present and some missing. An especially common missing value was the lower thickness of the rim, which could meaningfully be measured only on certain rim types that had a thickening both at the lip and below it, and as such was missing in most items (1857 observations). All rim-related variables were obviously missing in the body shards that were recorded. Also, the minimum thickness of the rim was meaningful only in rim forms that either had a thin part between the two thickenings, or were thinned, resulting in a high number of missing values (763).

I was also inclined to leave the field for ware types empty, as I considered recording the tempering materials along with their particle sizes and amounts more informative of the clay preparation. I thought that ware types could be created afterwards, when the original observations were analyzed. To define and label ware groups in the beginning of the study seemed to me to include a risk of creating categories that would not be meaningful, but would only reflect my own presuppositions. Such pre-defined ware groups would also not have been helpful in searching for the differences in the use of tempering materials for items which would have fallen into the same group. In the end, I created only two broad ware categories: one for the cooking pot ware with mineral tempering, presumed to be mainly added quartz, and another for the most typical tempering combination of basalt and chalk, used for the majority of the vessel types. Other patterns were not constant. A similar risk of creating groups that would in the end not be informative might also loom for other categories, such as rim types or vessel types, which I did create. However, for these types I had pre-knowledge from vessel forms published from other sites in Israel, and especially from drawings of the ceramics previously excavated at Tel Kinrot, which I considered more secure than the ware descriptions of the earlier report or find cards.

This section includes tables and graphs of the class frequencies, single variables measured with ratio and ordinal scales, and pairwise plots of two variables. I will start with the frequency data of the typological classes and then move on to measured features, portrayed in graphic representations for the whole data and for subsets, such as open and closed vessels or vessel classes, separately.

Most of the analyzed pottery derives from area U: 1964 items of a total of 2692 (Figs. 5.143A and 5.144A). This has both advantages and disadvantages: on one hand the stratigraphic sequence is most secure within area U. The local phases in area N can be related with those of area U to some extent, as these two areas can be physically connected. However, they are separated by a street (3520), thus increasing uncertainty. On the other hand, the material could actually better reflect the settlement if there were more areas or more material from other areas included. As of now, however, all results from analyses including all excavation areas are heavily dominated by the material from Area U.

The majority of the registered items are rim shards. This results from the retrieval strategy focusing on rims, while body shards were kept only selectively. Most of the items that could not be classified as any of the defined types (or vessel classes) are body shards. Therefore, the amount of unknown items appears much smaller when only rims and larger fragments are included. I have decided to use a subset excluding the body shards in most of the following analyses. This is both because of their lesser informative value and because of their unsystematic retrieval. Many analyses require that further selections be made, because of the low level of measurement (categorical variables) for many methods. In addition, some vessel classes are so rare that the number of retrieved items does not allow reliable statistics to be counted (e.g. lamps).

	Vessel class													
Area\	unknown	bowl	jar	cooking	krater	jug	pithos	small c.	stand	basin	chalice	lamp	kernos	Sum
N	22	31	19	36	11	10	2	2	1	3	7	0	0	144
U	254	419	311	356	198	264	31	46	9	12	56	7	1	1964
W	6	122	97	152	96	62	20	19	8	1	1	0	0	584
Sum	282	572	427	544	305	336	53	67	18	16	64	7	1	2692

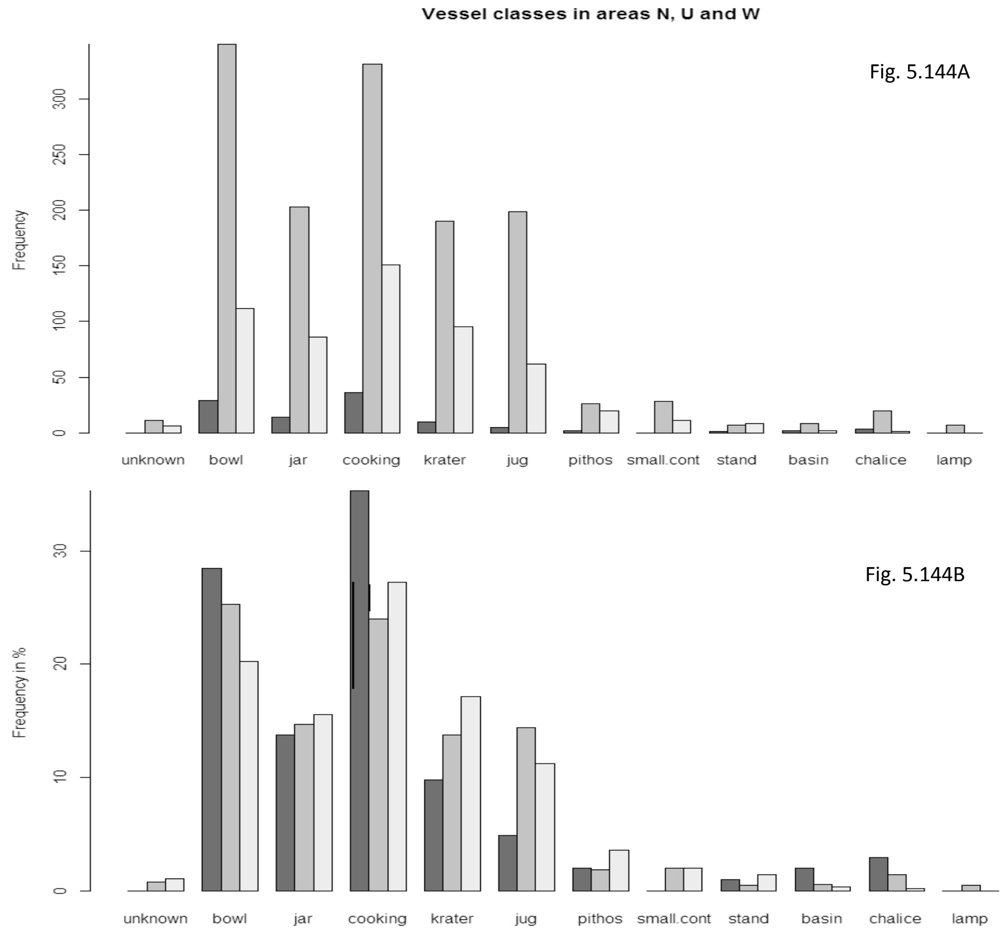
Fig 5.143A. Table of vessel classes according to the excavation areas. Area N is architecturally distinctive from area U on the western side of street 3520. A part of it was excavated with intensive retrieval. All shards (rim, body handle, and base fragments) are included, as well as fragments considered as deriving from the Early or Middle Bronze Age periods. Small c. refers to small containers (juglets, pyxides, and flasks).

	Vessel class, frequencies of identified items (in counts)												
Area\	unknown	bowl	jar	cooking	krater	jug	pithos	small.c	stand	basin	chalice	lamp	Sum
N	0	29	14	36	10	5	2	0	1	2	3	0	102
U	11	349	203	331	190	199	26	28	7	8	20	7	1379
W	6	112	86	151	95	62	20	11	8	2	1	0	554
Sum	17	490	303	518	296	266	48	39	16	11	24	7	2035

Fig 5.143B Table of vessel classes (frequency) according to the excavation areas. Body shards are excluded, as well as fragments considered as deriving from the Early or Middle Bronze Age periods (for a bar chart, see Fig. 5.144A).

	Vessel class, relative frequencies of identified items (in percentages)											
Area\unknown		bowl	jar	cooking	krater	jug	pithos	small c.	stand	basin	chalice	lamp	Sum
N	0.0	28.4	13.7	35.3	9.8	4.9	2.0	0.0	1.0	2.0	2.9	0.0	100.0
U	0.8	25.3	14.7	24.0	13.8	14.4	1.9	2.0	0.5	0.6	1.5	0.5	100.0
W	1.1	20.2	15.5	27.3	17.3	11.2	3.6	2.0	1.4	0.2	0.2	0.0	100.0

Fig. 5.143C Table of vessel classes (above) in percentages. Sub-set as above, for a bar chart, see Fig. 5.144B.



Figs. 5.144A and B. Bar charts of vessel classes according to the excavation areas. Body shards were excluded, as well as fragments considered as deriving from the Early or Middle Bronze Age periods. Black: area N, dark grey: area U, light grey: area W. Above (A): frequencies in counts; below (B): frequencies in percentages.

The amount of items is very different in the three areas (U, N, and W), reflecting the scale of excavations in each of the areas. However, the relative amounts of vessel classes are rather similar (Fig. 5.144B), indicating that functional differences between the excavated areas should not be dramatic. The similarity of class frequencies is especially clear when comparing the relative frequencies of areas U and W (Figs. 5.143C and 5.144B), while the slight deviations of class frequencies in area N are most likely due to the small sample size and not to real differences in the material (Kahneman 2011: 109–117).

Size-related Continuous Variables: Diameter and Rim Thicknesses

The width of the vessel opening was one important feature used while classifying the material. I measured rim diameter in millimeters. The thickness of the rim or wall was not explicitly used in the classification, as I considered the rim form more important in this respect. However, for some vessel classes it was essential: I defined pithoi and most kraters as having thick rims. I measured the rim thickness to 0.1 mm at two to four points: at the maximum, at the minimum, and at the point below the rim. In addition, for certain rim forms I also measured the thickness of a lower thickening. The variables of diameter are the only variables that I measured on a continuous scale. They are presented below in box plots and histograms. Box plots indicate the median by the thick line at the mid-box (median is the value at the middle, if the material was divided into two according to the values of the feature). The box itself includes half of the material, from the lower quartile (25 %) at the lower end to the upper quartile (75 %) on the upper end. The width of the box reflects the size of the group. The whiskers extend to the most extreme observed value, but not further than 1.5 times the range within the box. If there are observations that lie outside this range, they are drawn as small circles beyond the whiskers. I have used red hues when plotting open vessels and blue ones for closed vessels.

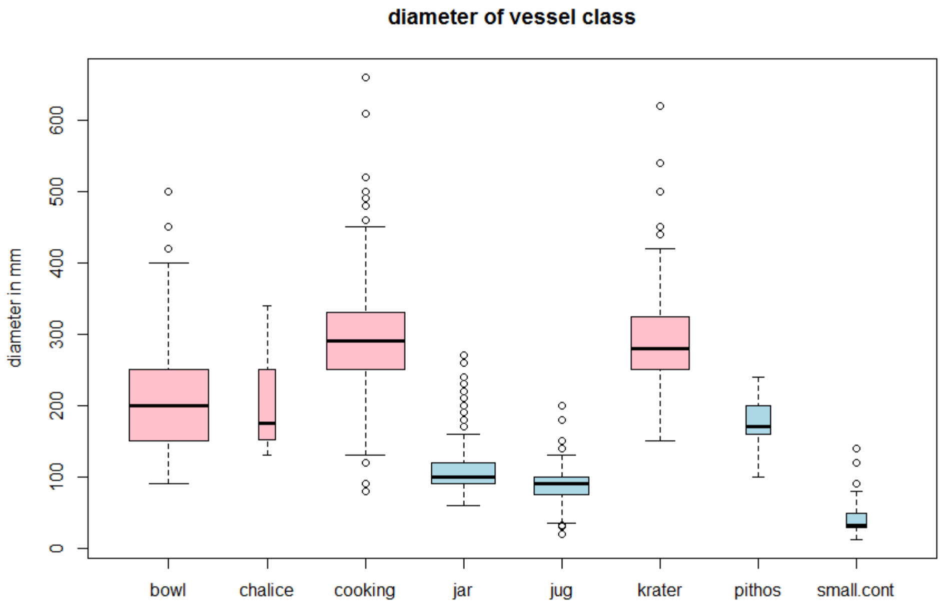


Fig. 5.145A) Box plots of the rim diameter, according to the identified vessel groups. Lamps were excluded because of their low number (n=7), as well as the basins (n=11), stands (n=16), and unknown (n=17). Red hues indicate open and blue hues closed vessels.

It can be seen from Figure 5.145A that the open vessel types (bowls, chalices, cooking pots, and kraters) differ from the closed vessel types (jars, jugs, pithoi, and small containers) as to their rim diameters for most of the material. At the same time, it is apparent that most vessel classes include much variation within themselves, and the distributions of the diameter are skewed towards the higher values, with the exception of pithoi. Only the pithoi overlap significantly with the smaller open vessels (bowls and chalices), with their diameters generally around 20 cm. However, the difference between these classes is clear in the rim forms as well as thickness (see below). For this reason, and in order to create more legible graphs, I will mostly treat open and closed vessels separately.

If we look at the distributions in the box plot (Fig. 5.145A) as well as in histograms (Figs. 5.145B), the overlap of bowls and chalices is clear. Both distributions also have reminiscent forms, in that they rise quickly to the maximum at 18–20 cm and then have a tail to the right towards the higher values. The distribution of bowls is closer to the normal curve as a result of the larger amount of items, there being 490 bowls and only 24 chalices. The histogram in Fig. 5.145B also includes lamps (n=7), and all of them appear to have a diameter in the same range as most of the chalices and bowls. This is natural, as the forming technique of the lamps appears to be similar to that of the small rounded bowls. However, it is good to remember that measuring the rim diameter of lamp fragments is often more difficult than measuring it for the other vessels, due to the presence of the nozzle. The form, as well as the placement indicating the range of the distribution of diameter of kraters and cooking pots, is very similar. These classes also share other characteristics, as discussed in the typology above.

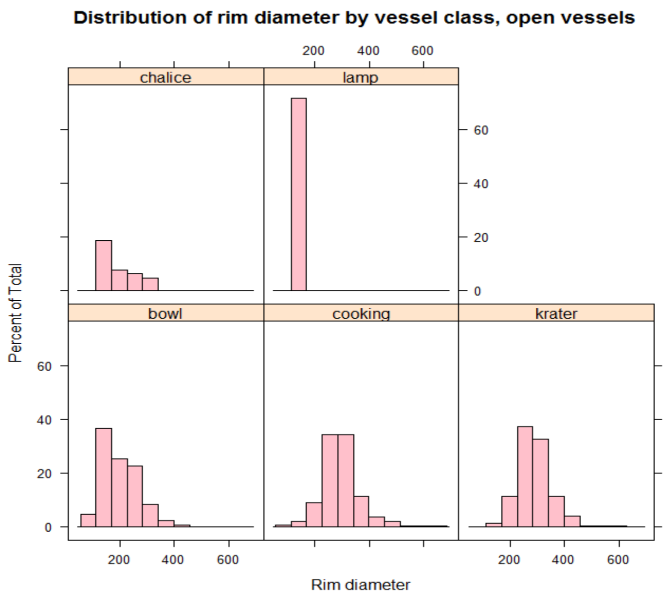
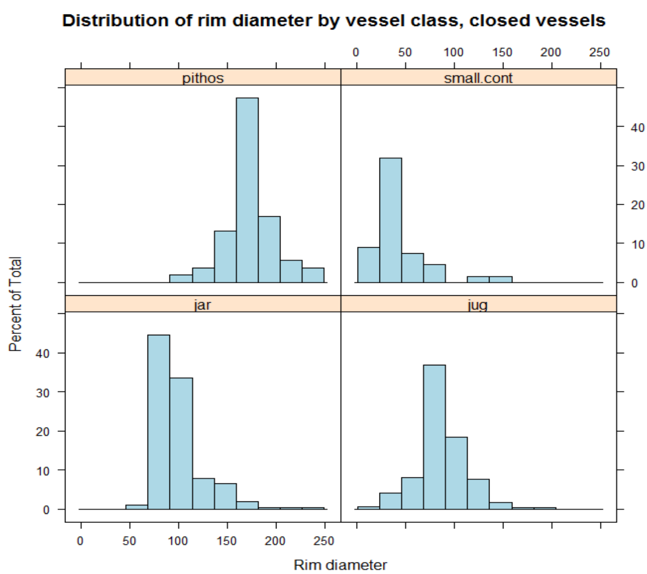


Fig. 5.145B) Histograms of the rim diameter of open vessels according to vessel groups (basins were excluded).



Figs. 5.145C) Histograms of the rim diameter of the closed vessel groups.

For the closed vessel groups, the diameter-distributions of pithoi and small containers differ from other closed vessels and have little overlap with them. However, distributions of jars and jugs have long whiskers overlapping with all other classes to some extent, and especially with each other. This overlap is indicative of the difficulties in separating these two classes from each other – a theme often referred to when classifying jugs (see above section 5.2.5).

While the diameters tend to be different for many classes, this clearly is only partially the case for thicknesses measured at the rim and below (Figs. 5.146 A–F). The maximum thicknesses differ between classes more than the thicknesses below the rim. The maximum thicknesses of bowls, chalices, jars, and jugs are similar to each other, and those of cooking pots and kraters are alike, while pithoi and small containers differ from all other classes to a fair degree. The thicknesses below the rim part overlap over all classes except the pithoi (which are thicker) and small containers (which are thinner). At the same time, the ranges of both maximum rim thickness and thickness below the rim of bowls overlaps with all vessel classes. The distributions of bowls, jars, and kraters are strongly skew towards the larger values, while the cooking pots, jugs, and pithoi present distributions closer to normal (Figs. 5.146C–F). The figure of the minimum thickness of the rim was very similar to the thickness below the rim, indicating that the differences between the vessel classes as to their rim parts lies in their shape and prominence, which is probably best reflected in the maximum thickness, while the minimum thickness is usually close to the wall thickness below the lip.

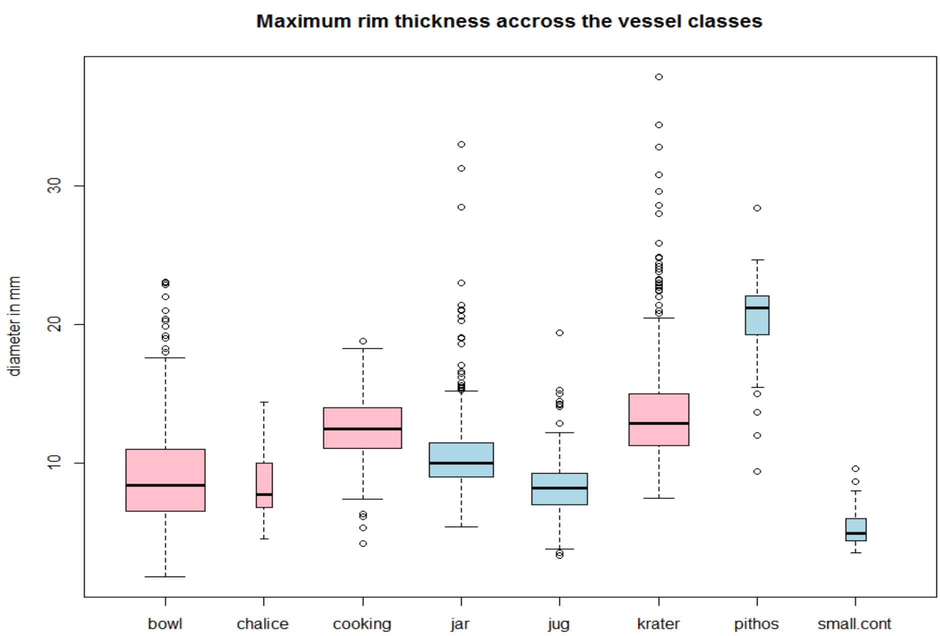
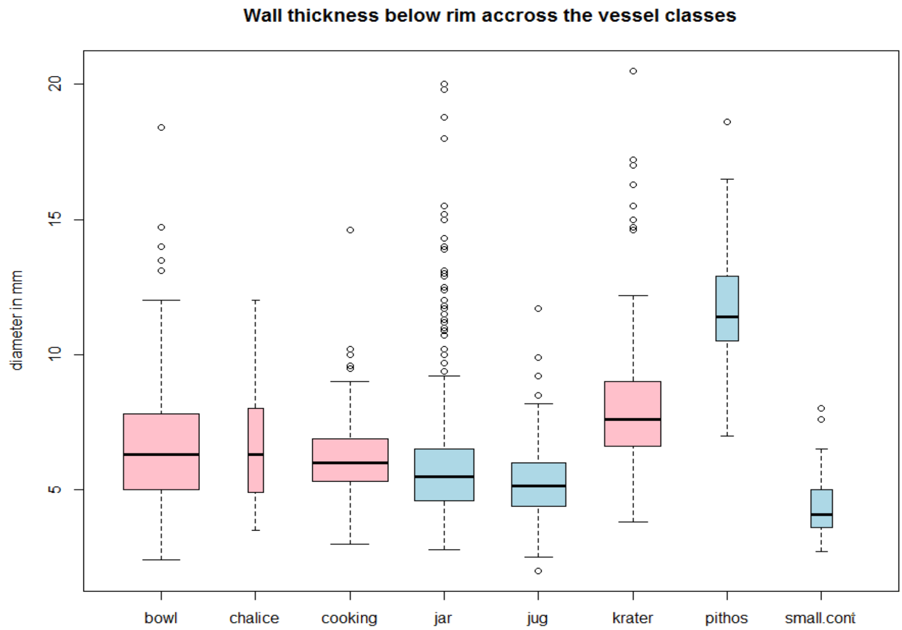
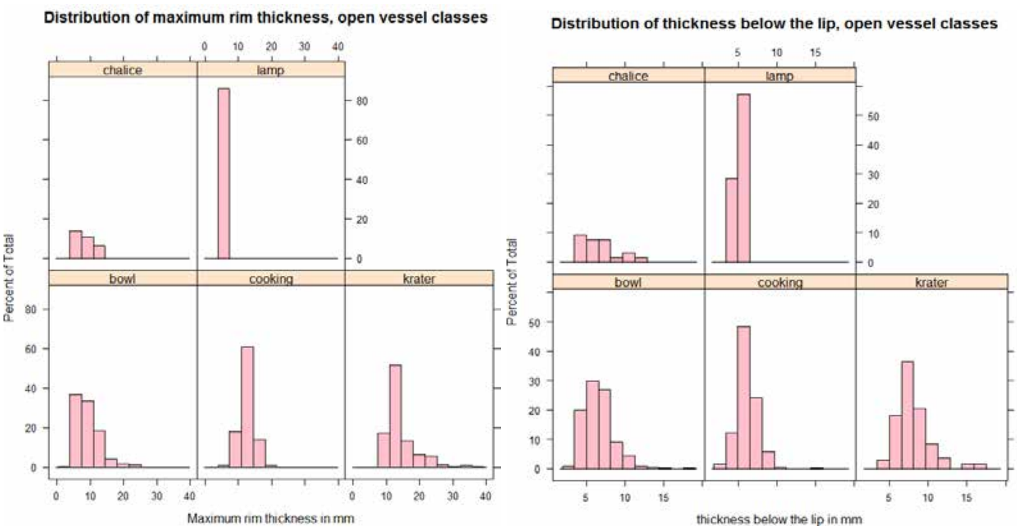


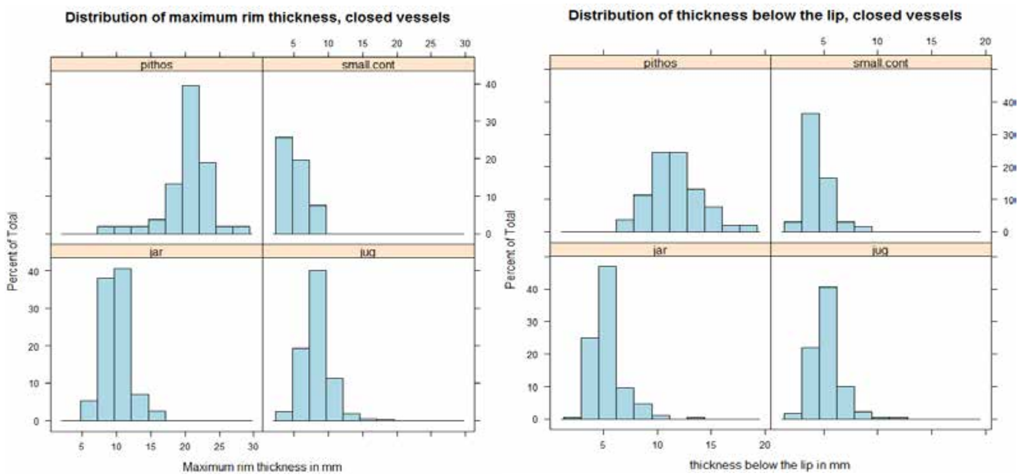
Fig. 5.146A Box plot of the maximum rim thickness of the lip of the vessels according to vessel class. The skew distributions in bowls, jars, and kraters is indicated by the circles above the whiskers.



Figs 5.146B Box plot of thickness below the lip of the vessels according to vessel class. The skew distributions in bowls, jars, and kraters is indicated by the circles above the whiskers.



Figs 5.146 C and D. Histograms of the distributions of C) Maximum rim thickness, and D) thickness below the lip of the open vessels according to vessel class. Note the strongly skewed distributions in bowls and kraters.



Figs 5.146 Histograms of the distributions of E) Maximum rim thickness, and F) thickness below the lip of the closed vessels according to vessel class.

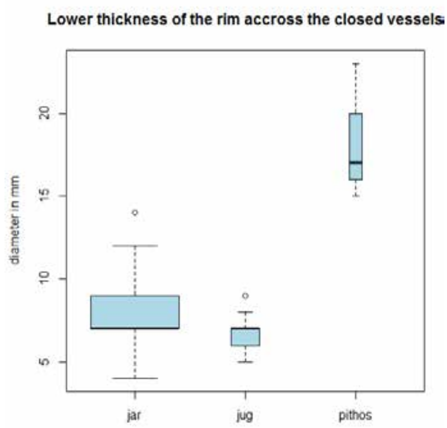


Fig 5.148G) Box plots of the lower thickening of the lip, of rim type 3E, typical for jars.

A third type of measured thickness of the rim was the thickness of the lower thickening (Fig. 5.148G), which appears in rim forms with two thickenings (rim type 3E), typical for jars and occurring occasionally in other vessel classes. The pithoi differ from jars and jugs, while there is considerable overlap between jugs and jars. However, this rim type has been identified on 165 jars as opposed to only 15 jugs and 5 pithoi, making the two latter groups statistically unreliable.

I expected that both thickness and diameter would reflect the vessel size, and therefore be associated and co-vary. There is indeed a trend that the maximum thickness of the rim grows as the diameter grows (Figs. 5.147–148), but the association is not very strong. It seems that the association also differs from open to closed vessel classes, as the open examples have much more variation in the diameter.

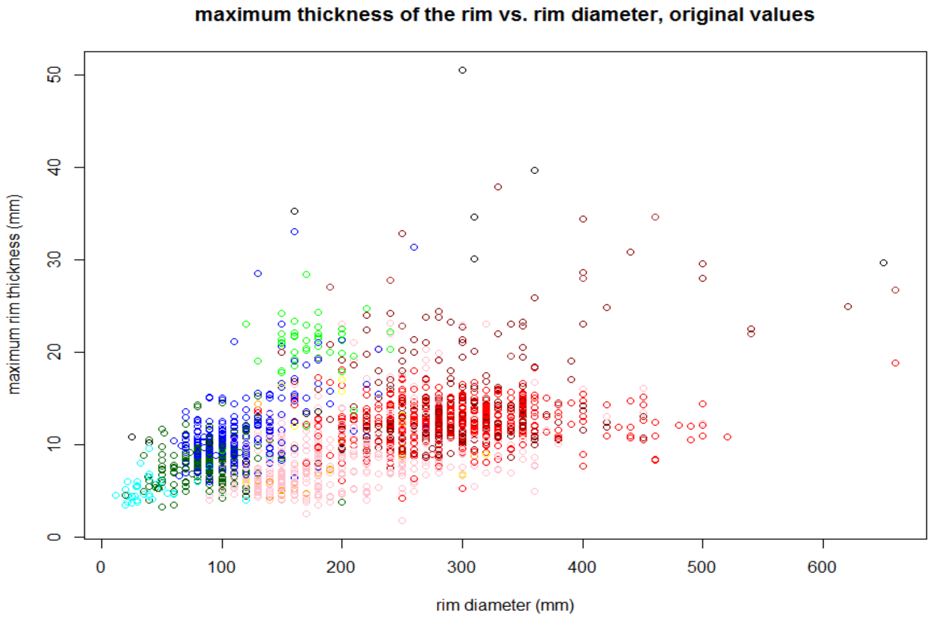


Fig. 5.147A Scatterplot of the rim diameter and maximum thickness of the rim with original values, in mm. Circle colors: turquoise=small containers, dark green=jugs, blue=jars, bright green=pithoi, pink=bowls, red=cooking pots, dark red=kraters, black=stand, orange=chalices, dark orange=lamp and yellow=unknown.

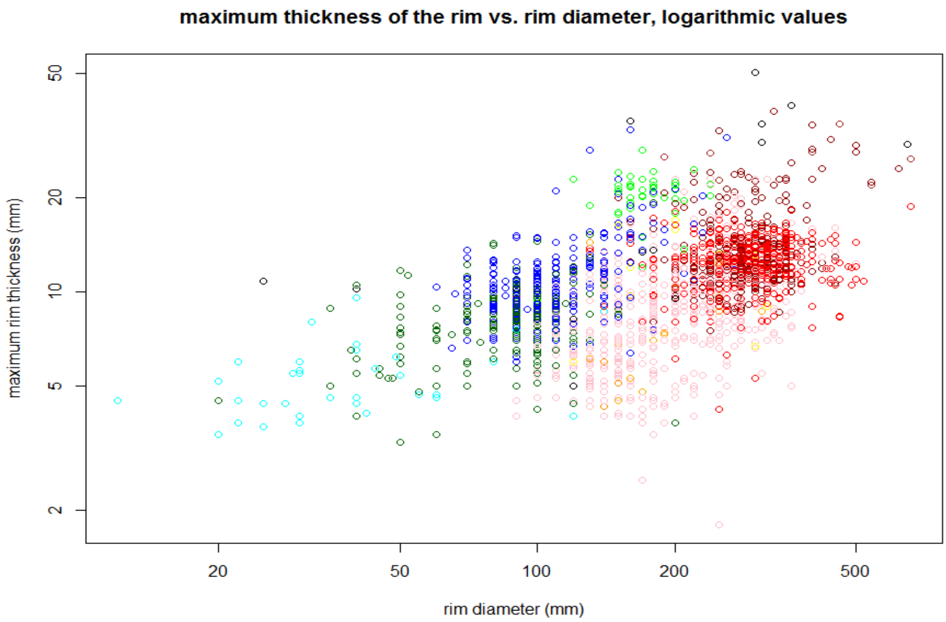


Fig. 5.147B Scatterplot of the rim diameter and maximum thickness of the rims. The scale is drawn according to the logarithmic values, while the mm on the axes are written according to the original values, colors as above.

Originally measured variables produce heteroscedastic relationships (Fig. 5.147A), meaning that the variation grows when the values increase. Therefore, I converted the original values into their logarithms (Fig. 5.147B). This means that we start to look at the relative change in the variables instead of the absolute change, as is attested by the change in the values ascribed on the axes. This is also meaningful for substantial reasons: a difference between bowls that have a diameter of 10 or 15 centimeters is more significant than a difference between generally wide cooking pots with a diameter of 30 or 35 cm. The conversion makes the relationships between variables with skewed distributions more linear. Establishing the linearity of the relationship is essential for modelling relationships such as counting "how much wider are the kraters than bowls." However, for the purposes of the visual inspection of the differences between vessel classes in their distributions according to the features, the homoscedasticity is not a problem, and can be regarded as an inherent feature of the material. For this reason, the Figures (5.148) presenting the relationships of diameter and several points of thickness are plotted according to their original values. Figures 5.148 attest how some vessel classes are closer to each other with regard to the measured features of the rim part: bowls vs. chalices, cooking pots vs. kraters, and jars vs. jugs. This was to some extent evident already when looking at these variables one by one (Figs. 5.145–146), while the joint graphic illustrates that the relationships between the measured features also seems to be similar between these overlapping classes.

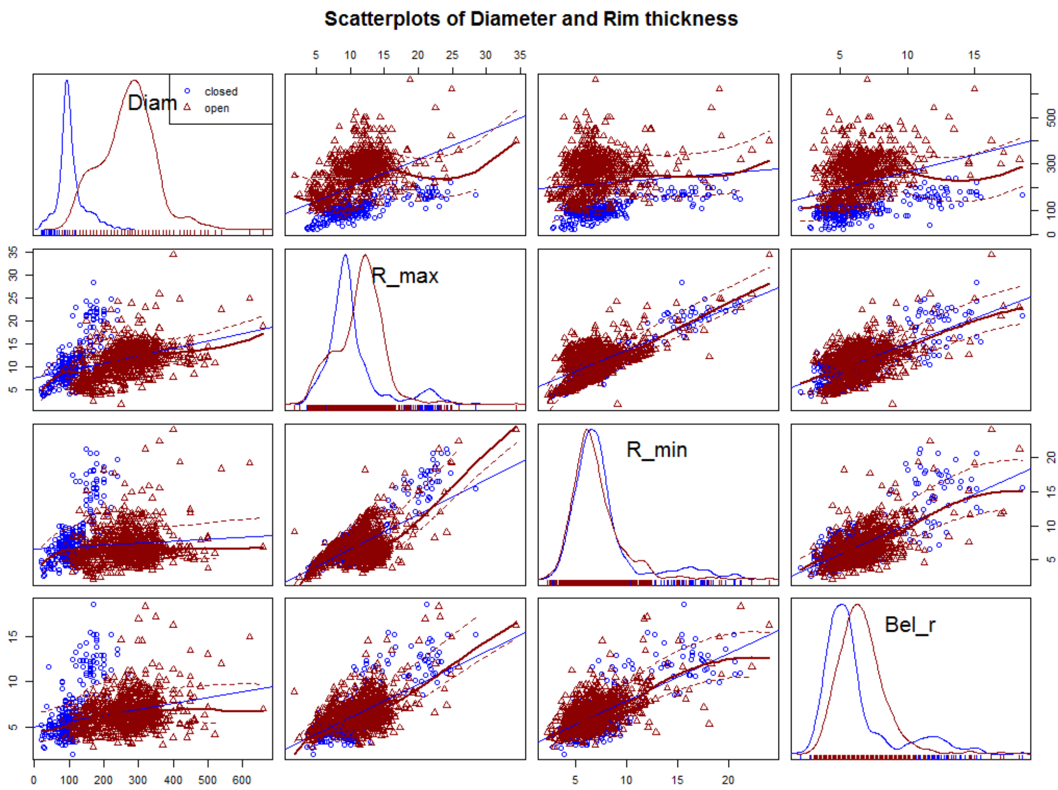


Fig. 5.148a Diameter of the rim and the thicknesses of and below the rim plotted against each other, when all vessel classes are included. Open vessels are indicated by red triangles and closed vessel by blue circles. All included variables are in mm. Diam: Diameter of the rim; R_max: maximum thickness of the rim, R_min: minimum thickness of the rim; Bel_r: thickness of the wall below the lip.

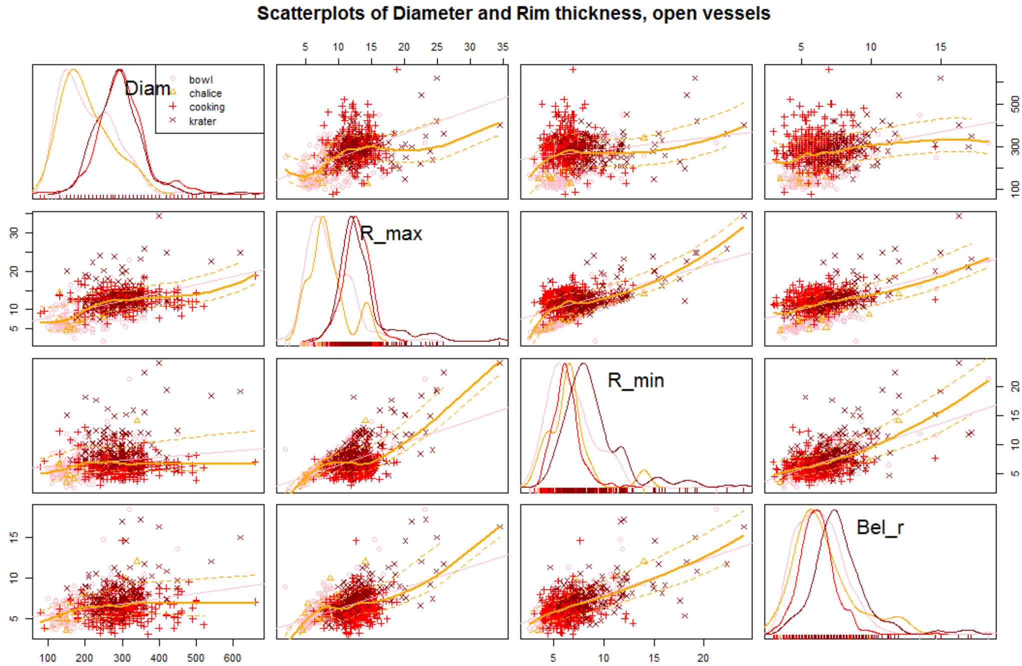


Fig. 5.148c Continuous variables plotted against each other, when open vessel classes are included. Included variables (all in mm): Diam: Diameter of the rim Rim_max: maximum thickness of the rim R_min: minimum thickness of the rim

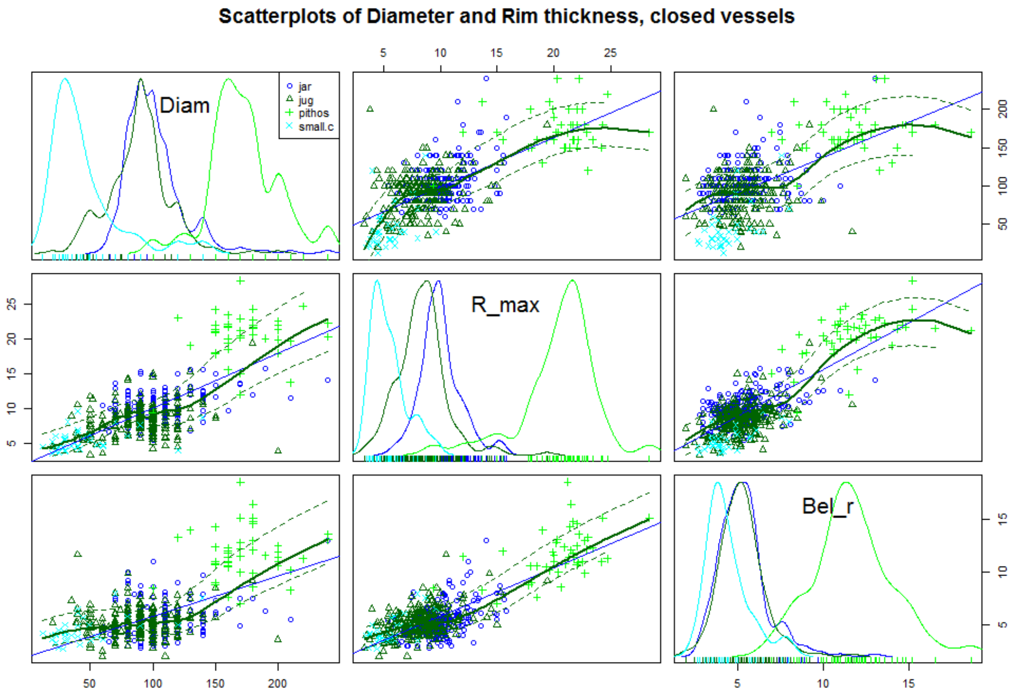


Fig. 5.148d Continuous variables plotted against each other, when closed vessel classes are included. Included variables (all in mm): Diam: Diameter of the rim Rim_max: maximum thickness of the rim Bel_r: thickness below the lip.

Tempering materials

When potters prepare the clay before forming the vessels, they often need to clean the clay of impurities that they consider problematic, and/or add non-plastic materials to the clay. The added non-plastics are called temper. However, it is rarely possible to differentiate added inclusions from those intrinsic to the clay (Rice 1987: 116–123; 406–409; Tite 1999: 184–185). High quantities of non-plastics in angular form can be considered indicative of their use as temper. The difference between the size and/or form of the non-plastic inclusions may also be used for inferring whether they are intrinsic or added (Rice 1987: 410; Tite 1999: 185).

The particles interpreted as quartz commonly occurred in large quantities, and as angular particles of medium size (0.3–0.9 mm in maximum width), but almost exclusively in cooking pots (Figs. 5.150a, 151a, 152a). I identified quartz by its angular and often shiny appearance and hardness, as opposed to the softness of the light-colored chalk particles. The amount and angularity indicate that quartz was most likely added as temper. Inclusions identified as quartz may actually be chert, which appears in local limestone formations (see section 3.1). The cooking pots were identified by the *set of inclusions*, form, and use-wear. The risk of circular reasoning is avoided, as there are other features that coincide with the distinctive tempering: rim forms (section 5.3.3.2), color (see below), and use-wear. The use-wear was, however, recorded for only a small fraction of the material, and therefore I have not further analyzed it. For other inclusions, the interpretation as tempering is an assumption that would require further study. At least mixed minerals (sand), dark and red grits that tend to be present in small quantities and as rounded particles, may in fact be inclusions inherent in the used clay. Small black inclusions identified as basalt were usually present in large quantities, which may indicate their use as temper. However, the particles were small and rounded, which might indicate that the material was inherent in the clay. The inclusions interpreted as chalk are present in smaller quantities, while the particles tend to be fairly large and rounded – the size indicating its use as temper and the amount and form being typical for materials inherent in clays. Both basalt and limestone are locally well attested rocks, adding to the probability that such inclusions would be inherent in the clays. However, tempering materials are usually procured from a source close to the potter (Arnold 1985: 32–57; Rice 1987: 116–118).

Inclusions in the clay body, or tempering materials, are constantly recorded in the ceramic reports, but they are rarely discussed at length. The following tables clarify the patterning that I was able to achieve through macroscopic observations. Macroscopic inspection always provides the first step for creating ware groups of petrographic studies. It would be important to build a bridge between these two aspects, as petrographic (or chemical) analyses will always be performed only on a sample of all ceramics. While inclusions can be observed as readily on body fragments as on rim shards or whole vessels, I have decided to use all available material when analyzing the patterns in the use of tempering materials. Therefore, the sample (N=2665) is larger in the tables concerning tempering than it was for the rim related features of diameter and thickness. There were few missing values in the observed tempering materials. This may to some extent compensate for the insecure identification of the raw materials. The tables are further used in the correspondence analysis (section 5.3.2).

Tempering material and vessel class

	Main tempering material									
Class (all)	no	**basalt**	**quartz**	chalk	flint	dark	sand	red	organic	Sum
unknown	0	**162**	57	22	0	8	13	4	15	281
bowl	4	**420**	42	54	0	9	6	3	25	563
jar	0	**311**	37	46	0	11	9	3	8	425
cooking	7	6	**437**	29	1	0	59	0	2	541
krater	0	**257**	16	14	0	4	1	0	11	303
jug	0	**210**	42	50	0	14	7	3	5	331
pithos	0	**49**	1	2	0	0	1	0	0	53
small cont.	1	**33**	12	11	0	1	1	3	0	62
stand	0	**15**	2	0	0	1	0	0	0	18
basin	0	**14**	0	0	0	0	1	0	1	16
chalice	0	**45**	7	7	0	1	0	0	4	64
lamp	0	4	0	2	0	0	0	0	1	7
kernos	0	1	0	0	0	0	0	0	0	1
Sum	12	1527	653	237	1	49	98	16	72	2665

Fig. 5.150a Vessel class and main tempering material, all material included. Relative proportions of temper in the vessel group (according to rows) over 50 % have been **bolded** and proportions over 75 % are also highlighted (except for the classes with n<10). In addition to the line above sum, cooking pots with a different profile are underlined. "Dark" means dark minerals, not further identified, "red" indicates red grits, not identified to a specific mineral. "Sand" indicates many mineral grits.

	Main tempering material									
Class	no	**basalt**	**quartz**	chalk	flint	dark	sand	red	organic	Sum
unknown	0	**162**	57	22	0	8	13	4	15	281
bowl	4	**420**	42	54	0	9	6	3	25	563
jar	0	**311**	37	46	0	11	9	3	8	425
cooking	7	6	**437**	29	1	0	59	0	2	541
krater	0	**257**	16	14	0	4	1	0	11	303
jug	0	**210**	42	50	0	14	7	3	5	331
pithos	0	**49**	1	2	0	0	1	0	0	53
small cont.	1	**33**	12	11	0	1	1	3	0	62
chalice	0	**45**	7	7	0	1	0	0	4	64
Sum	12	1493	651	235	1	48	97	16	70	2623

Fig. 5.150b Vessel groups with over 20 items included, main temper. Text formatting as above.

	Second tempering material									
Class	no	basalt	quartz	**chalk**	flint	dark	sand	red	organic	Sum
unknown	27	34	48	86	0	13	55	9	9	281
bowl	20	40	63	**351**	0	22	53	5	9	563
jar	9	39	63	**255**	0	19	25	9	6	425
cooking	141	44	35	*236*	0	15	57	0	13	541
krater	3	15	38	**227**	1	2	10	1	6	303
jug	9	38	52	**181**	0	18	22	3	8	331
pithos	1	1	5	**43**	0	3	0	0	0	53
small cont.	2	5	10	*30*	0	0	5	6	4	62
chalice	2	6	7	**39**	0	4	6	0	0	64
Sum	214	222	321	1448	1	96	233	33	55	2623

Fig. 5.150c. Vessel groups with over 20 items included, secondary temper. Text formatting as above, and relative proportions over 40 % are in *italics.*

There are some constant patterns (Figs. 5.150a–c): the main temper is basalt for most vessel classes. Its frequency often exceeds 75 %, and is only slightly less for chalices (70 %). The jugs (with basalt as the main temper in 63 %) and small containers (53 %) have a less pronounced pattern in this respect. The main temper of the cooking pots is quartz in 80 % of the cases. The secondary temper is most commonly chalk (over 30 % in all vessel groups, while the patterning is less strong than for the main temper). If the material that can both be considered residual on typological grounds (and as usually being worn shards) and also originates from the Early and Middle Bronze Age periods is excluded, the pattern is even clearer (Figs. 5.150 d–e). This is because in the earlier materials there is not such a clear pattern in the clay fabric in general, nor distinctions between the vessel classes (Figs. 5.150.f–g). This indicates a sharp difference in the clay preparation between the Iron Age and the Early Bronze Age, which is natural because of the temporal distance between the materials. If we look at the material that on typological grounds seems to derive from the end of the Middle Bronze Age II to the Late Bronze Age, the pattern is closer to that of the material typologically (and stratigraphically) assigned to the (Late Bronze Age II and) Iron Age (Figs. 5.150d–h). This may indicate that the potting tradition of the Early Iron Age is rooted in the Late Bronze Age, reflecting continuity between these periods. Also, typological differences between the Late Bronze Age and the Early Iron Age are vague for some vessel types, such as rounded or carinated bowls (see section 5.2). However, the amount of items in the earlier subsets is much smaller (for EB, n=247, and for MBIIB–LBI, n=193) than the material from the end of the Late Bronze Age and the Iron Age (n=2317).

	Main tempering material									
Class (no EB/MB)	no	**basalt**	**quartz**	chalk	flint	dark	sand	red	organic	Sum
unknown	0	**68**	18	20	0	3	10	1	14	134
bowl	4	**387**	33	40	0	5	5	1	19	494
jar	0	**258**	22	40	0	9	3	3	5	340
cooking	7	4	**423**	29	1	0	58	0	0	522
krater	0	**253**	16	13	0	3	1	0	11	297
jug	0	**204**	38	47	0	13	6	1	4	313
pithos	0	**49**	1	2	0	0	1	0	0	53
small cont.	1	**33**	11	9	0	1	1	3	0	59
stand	0	**15**	2	0	0	1	0	0	0	18
basin	0	**14**	0	0	0	0	1	0	1	16
chalice	0	**45**	7	7	0	1	0	0	4	64
lamp	0	**4**	0	2	0	0	0	0	1	7
Sum	12	1334	571	209	1	36	86	9	59	2317

Fig. 5.150d. Vessel classes and the main tempering material, when material considered as EB–MB was excluded, main temper. Text formatting as above.

	Second tempering material									
Class (no EB/MB)	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
unknown	15	12	14	*58*	0	4	21	3	7	134
bowl	16	33	53	**327**	0	14	39	4	8	494
jar	3	26	46	**227**	0	14	12	7	5	340
cooking	137	42	34	*231*	0	14	55	0	9	522
krater	2	15	37	**224**	1	2	9	1	6	297
jug	7	37	46	**179**	0	13	20	3	8	313
pithos	1	1	5	**43**	0	3	0	0	0	53
small cont.	2	4	10	**30**	0	0	3	6	4	59
stand	2	0	2	**14**	0	0	0	0	0	18
basin	0	0	0	**12**	0	0	3	0	1	16
chalice	2	6	7	**39**	0	4	6	0	0	64
lamp	0	1	1	4	0	1	0	0	0	7
Sum	187	177	255	1388	1	69	168	24	48	2317

Fig. 5.150e Vessel groups with material considered as EB–MB excluded, secondary temper. Formatting as above.

Main tempering material

Class (EB)	no	**basalt**	quartz	chalk	flint	dark	sand	red	organic	Sum
unknown	0	**91**	34	2	0	5	3	3	1	139
bowl	0	**14**	3	2	0	3	1	2	1	26
jar	0	**46**	12	3	0	2	5	0	2	70
cooking	0	0	**2**	0	0	0	0	0	0	2
jug	0	3	2	1	0	0	1	2	0	9
kernos	0	**1**	0	0	0	0	0	0	0	1
Sum	0	155	53	8	0	10	10	7	4	247

Fig. 5.150f. Material considered EB only included, main temper. Text formatting as above.

Second tempering material

Class (EB)	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
unknown	12	20	33	26	0	9	31	6	2	139
bowl	0	4	2	9	0	2	8	1	0	26
jar	5	10	16	21	0	5	10	2	1	70
cooking	0	0	0	2	0	0	0	0	0	2
jug	0	0	*4*	1	0	2	2	0	0	9
kernos	0	0	0	0	0	1	0	0	0	1
Sum	17	34	55	58	0	19	51	9	3	247

Fig. 5.150g. Material considered EB only included, secondary temper. Text formatting as above.

Main tempering material

Class (LB)	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
unknown	0	*4*	*4*	1	0	0	0	0	0	9
bowl	0	**51**	12	18	0	1	0	0	7	89
jar	0	**21**	5	2	0	0	1	0	0	29
cooking	0	1	**33**	2	0	0	5	0	1	42
krater	0	**3**	0	0	0	1	0	0	0	4
jug	0	7	4	4	0	2	0	0	1	18
small.c	0	0	2	0	0	0	0	0	0	2
Sum	0	87	60	27	0	4	6	0	9	193

Fig. 5.150h. Material considered MBII–LB II only included, main temper. Text formatting as above.

Second tempering material

Class (LB)	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
unknown	0	1	0	**6**	0	0	2	0	0	9
bowl	7	9	12	*44*	0	8	4	2	3	89
jar	1	4	2	**20**	0	1	1	0	0	29
cooking	12	4	3	15	0	0	3	0	5	42
krater	0	0	1	3	0	0	0	0	0	4
jug	0	3	3	7	0	3	2	0	0	18
small.c	0	1	0	0	0	0	0	1	0	2
Sum	20	22	21	95	0	12	12	3	8	193

Fig. 5.150i. Material considered MBII–LB II only included, secondary temper. Text formatting as above.

The differences between the vessel classes indicates that during the (Late Bronze Age and) Iron Age the clay planned to be used for the cooking pots was prepared in a distinctive way compared to all other vessels, while such a phenomenon is not evident for the Early Bronze Age pottery. This may be due to the lack of cooking wares in the relatively small amount of Early Bronze Age material. On the other hand, as no distinctive patterns across vessel forms of the Early Bronze Age can be discerned, the identification of cooking pots is much more difficult. At least some of the hole-mouthed vessels may have been used for cooking, as indicated by one fully restored, sooty hole-mouth vessel (identified as jar) from area R, where early periods were more extensively excavated and some well-preserved vessels were found. The few cooking pot fragments of the Middle Bronze Age have traces of organic temper.

Tempering material and its quantity

The quantity and size of the inclusions can be used for assessing their function as temper or their inherent presence in the clay, as discussed above. When all material is considered, basalt dominates the material appearing mainly from 'medium' quantities (5–10 % of the clay mass) to 'much' (over 10 %) quantities. The recorded amount is based on macroscopic evaluation, with the help of a chart for estimating proportions of mottles and coarse fragments (in MSCC 2000). Also, quartz as a main temper appears in fairly large quantities (Fig. 5.151a). This is at least partially due to the definition of the *main* temper as the identified inclusions that seemed to appear most frequently in the sherd. Similarly, for the secondary temper it is natural that the quantity is less than that of the main temper, most commonly recorded as being present in 'little' or 'medium' quantities (Fig. 5.151b). The abundant amount of items without a secondary temper is to a large extent due to the tendency of cooking pots (Fig. 5.150c, e) to have only quartz added, and no other inclusions.

Basalt, quartz, and chalk inclusions dominate the assemblage as a whole. They constitute 91 % of the recorded main tempering material (observed inclusions), and 76 % of the secondary tempering material. Even for the Early Bronze Age pottery, the materials recognized were mainly of these three, even though their dominance is slightly less strong: for main tempering material 88 %, and for the secondary tempering material 53 % (Figs. 5.151a–b, e–f). As the Iron Age dominates the assemblage, the differences between the assemblage as a whole and with the earliest periods excluded were minimal (Figs. 5.151a–d).

There is a counter-intuitive phenomenon in the following tables that requires a note: while recording, I allowed myself to record for quantity 0 ('none'), even if there were one or two grits, as long as their proportion of the clay body was below a threshold of 1 %. Therefore, there are few occasions were material in indicated for the quantity of (almost) none. The smallest amounts of inclusions most probably do not reflect intentional tempering. This is likely also the case for the inclusions with the quantity of very little (1–2 %).

	Main tempering material									
quantity	no	**basalt**	**quartz**	chalk	flint	dark	sand	red	organic	Sum
(almost) no temper (0)	12	0	0	1	0	0	0	0	1	14
very little (1)	0	10	5	*13*	0	0	0	0	1	29
little (2)	0	161	100	90	1	14	14	9	38	427
medium (3)	0	**545**	208	95	0	25	43	7	30	953
much (4)	0	**811**	340	38	0	10	41	0	2	1242
Sum	12	1527	653	237	1	49	98	16	72	2665
% of Sum	0.5	57.3	24.5	8.9	0	1.8	3.7	0.6	2.7	100

Fig. 5.151a. Cross table of quantity (the amount of inclusions observed) and material of the main temper. Text formatting as above, and relative frequencies on *columns* over 50 % are underlined. All material is included.

	Second tempering material									
quantity & material	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
(almost) no temper (0)	**216**	0	1	3	0	0	0	1	1	222
very little (1)	0	21	17	**95**	1	5	4	4	2	149
little (2)	0	140	242	**1123**	0	69	158	24	39	1795
medium (3)	0	55	46	**234**	0	23	73	4	13	448
much (4)	0	7	18	*23*	0	1	1	0	1	51
Sum	216	223	324	1478	1	98	236	33	56	2665
% of Sum	8.1	8.4	12.1	55.5	0	3.7	8.9	1.2	2.1	100

Fig. 5.151b. Cross table of quantity and material of the secondary temper. Text formatting as above.

	Main tempering material									
quantity (no EB/MB)	no	**basalt**	quartz	chalk	flint	dark	sand	red	organic	Sum
(almost) no temper (0)	**12**	0	0	1	0	0	0	0	1	14
very little (1)	0	9	3	*11*	1	0	0	0	1	24
little (2)	0	120	73	74	1	9	12	6	31	326
medium (3)	0	**449**	175	87	0	17	34	3	24	789
much (4)	0	**756**	320	36	0	10	40	0	2	1164
Sum	12	1334	571	209	1	36	86	9	59	2317
% of Sum	0.5	57.6	24.6	9.0	0	1.6	3.7	0.4	2.5	100

Fig. 5.151c. Cross table of quantity and material of the main temper. Material considered as deriving from the EB–MB periods is excluded.

	Second tempering material									
quantity (no EB/MB)	no	basalt	quartz	**chalk**	flint	dark	sand	red	organic	Sum
(almost) no temper (0)	**187**	0	1	3	0	0	0	1	1	193
very little (1)	0	18	12	**91**	1	3	4	4	2	135
little (2)	0	107	183	**1047**	0	47	118	15	34	1551
medium (3)	0	45	41	**226**	0	19	45	4	11	391
much (4)	0	7	18	*21*	0	0	1	0	0	47
Sum	187	177	255	1388	1	69	168	24	48	2317
% of Sum	8.1	6.6	11.0	59.9	0	2.6	7.3	1.0	2.1	100

Fig. 5.151d. Cross table of quantity and material of the secondary temper. Material considered as deriving from the EB–MB periods is excluded.

	Main tempering material									
quantity (EB)	no	**basalt**	quartz	chalk	flint	dark	sand	red	organic	Sum
very little (1)	0	1	0	0	0	0	0	0	0	1
little (2)	0	*28*	16	5	0	4	2	3	2	60
medium (3)	0	**82**	26	3	0	6	7	4	2	130
much (4)	0	**44**	11	0	0	0	1	0	0	56
Sum	0	**155**	**53**	8	0	10	10	7	4	247
% of Sum	0	62.8	21.5	3.2	0	4.0	4.0	2.8	1.6	100

Fig. 5.151e. Cross table of quantity and material of the main temper, including only the material considered as deriving from the EB-period.

	Second tempering material									
quantity (EB)	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
(almost) no temper(0)	**17**	0	0	0	0	0	0	0	0	17
very little (1)	0	1	**4**	2	0	1	0	0	0	8
little (2)	0	25	46	54	0	13	28	9	1	176
medium (3)	0	8	5	3	0	4	**23**	0	1	44
much (4)	0	0	0	0	0	1	0	0	1	2
Sum	17	34	55	59	0	19	51	9	3	247
% of Sum	6.9	13.8	22.3	23.9	0	7.7	20.6	3.6	1.2	100

Fig. 5.151f. Cross table of quantity and material of the secondary temper, including only the material considered as deriving from the EB-period.

Tempering material and its particle size

The use of basalt as the main tempering material is by far the most common, and it is used in small (diameter less than 0.3 mm) to medium (diameter of 0.3–0.9 mm) sized particles. Only when the Early Bronze Age ceramics are analyzed separately is their particle size most commonly large (Fig. 5.152e). The quartz temper typical of cooking pot ware is generally used in larger particles (most commonly of the medium size). The materials that are less frequent appear mostly in medium size, while the differences in particle sizes are less patterned, which may indicate that they were not intentionally added. Chalk appears to always be the most common secondary tempering material, and it mainly occurs as relatively large particles (diameter over 0.3 mm) (Figs. 5.152).

Temper_size (all)	Main tempering material									
	no	**basalt**	**quartz**	chalk	flint	dark	sand	red	organic	Sum
(almost)no temper (0)	**12**	0	0	0	0	0	0	0	0	12
small (1)	0	**762**	83	50	0	11	17	1	28	952
medium (2)	0	*583*	488	94	0	30	63	12	34	1304
coarse (3)	0	*179*	82	92	1	8	18	3	10	393
Sum	12	1524	653	236	1	49	98	16	72	2661

Fig. 5.152a. All material included, main temper.

Temper_size (all)	Second tempering material									
	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
no temper (0)	**216**	0	1	0	0	0	0	0	0	217
small (1)	0	66	62	137	0	24	78	9	20	396
medium (2)	0	109	172	**652**	0	53	141	18	28	1173
coarse (3)	0	46	89	**679**	1	21	17	6	8	867
Sum	216	221	324	1468	1	98	236	33	56	2653

Fig. 5.152b. All material included, secondary temper.

Temper_size (no EB&MB)	Main tempering material									
	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
no temper (0)	**12**	0	0	0	0	0	0	0	0	12
small (1)	0	**740**	67	45	0	11	16	1	26	906
medium (2)	0	*522*	452	80	0	23	58	8	25	1168
coarse(3)	0	69	52	83	1	2	12	0	8	227
Sum	12	1331	571	208	1	36	86	9	59	2313

Fig. 5.152c EB & MB material excluded, main temper.

Temper_size (no EB&MB)	Second tempering material									
	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
no temper (0)	**187**	0	1	0	0	0	0	0	0	188
small (1)	0	60	44	129	0	18	58	9	20	338
medium (2)	0	85	143	**610**	0	38	100	11	21	1008
coarse(3)	0	30	67	**640**	1	13	10	4	7	772
Sum	187	175	255	1379	1	69	168	24	48	2306

Fig. 5.152d. EB & MB material excluded, secondary temper.

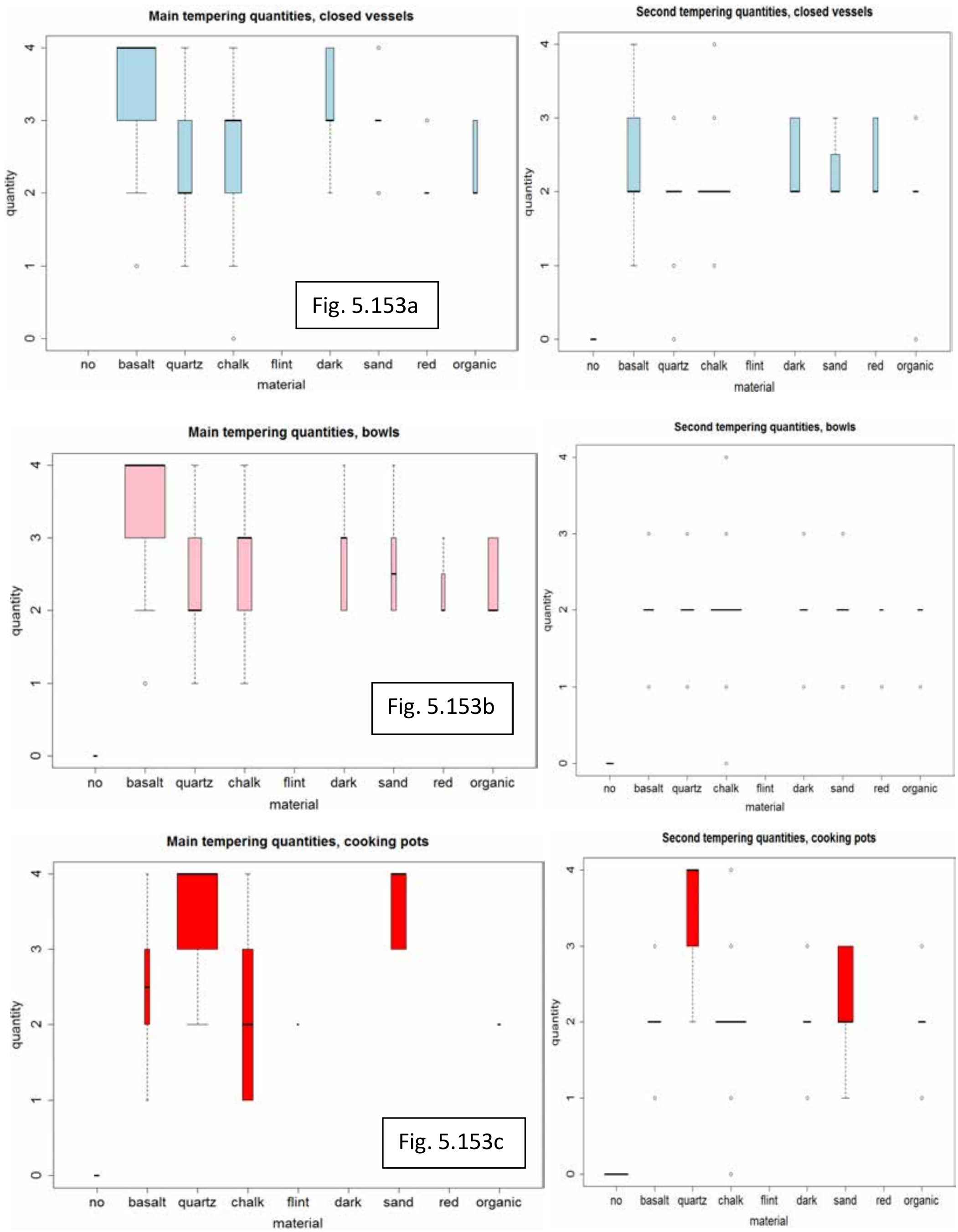
Temper_size (EB)	Main tempering material									
	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
small (1)	0	**12**	7	1	0	0	0	0	1	21
medium (2)	0	**42**	24	3	0	5	4	4	2	84
coarse(3)	0	**101**	22	4	0	5	6	3	1	142
Sum	0	155	53	8	0	10	10	7	4	247

Fig. 5.152e. Only EB material, main temper.

Temper_size (EB)	Second tempering material									
	no	basalt	quartz	chalk	flint	dark	sand	red	organic	Sum
no temper (0)	17	0	0	0	0	0	0	0	0	17
small (1)	0	1	*15*	6	0	2	10	0	0	34
medium (2)	0	19	19	27	0	11	34	7	2	119
coarse(3)	0	14	21	26	0	6	7	2	1	77
Sum	17	34	55	59	0	19	51	9	3	247

Fig. 5.152f. Only EB material, secondary temper.

Basalt is the most commonly identified inclusion used as the main tempering material in all size groups, due to its general abundancy (above). Basalt tends to be used as small particles, while quartz tends to be used as medium sized grits, and the sizes of chalk inclusions are divided evenly between medium and coarse, and are rarely small.



Figs. 5.153.a–c illustrate the distribution of the **main** tempering material of a) closed vessels, b) bowls, and c) cooking pots on the left, and the secondary tempering material on the right, respectively. While closed vessels and bowls present a very similar profile, the cooking pots differ clearly from the other vessel groups.

The cooking pots differ from other vessels in their different set of tempering material. This is by necessity, as the class was defined partially by its distinctive ware. However, the morphology with distinctive rim forms and use wear (including color) formed a constant pattern within the ware. It is remarkable how little variation there is in other vessel classes that I was able to identify macroscopically. A petrographic study would be needed to assess the accuracy of this observation. While it seems clear that the cooking pots usually have a distinctive fabric, without petrographic (and chemical) analyses it is difficult to ascertain how much this is due to a distinctive set of tempering and how much to the use of different clays. However, it has been attested that potters may use different clays for certain wares (Tite 1999: 216), especially for the clay paste designed for cooking pots (Arnold 1985: 23–28). I registered the angular and shiny inclusions to be quartz. However, such an appearance would fit with several other minerals as well, such as feldspars or calcite crystals – minerals that have a lower thermal expansion rate than quartz and would therefore be more suitable tempering materials for cooking wares. During the Byzantine period in Palaestina Tertia, certain clays were preferred for amphorae versus other clays preferred for cooking wares in highly specialized workshops (Holmqvist & Martinon-Tórres 2011).

Hardness and colors

Features of hardness and color varied very little in general. Only the class of cooking pots constantly differs from the other vessel classes in their brittle stand (Fig. 5.154) and their dark color, on both the surfaces and in the fresh cut matrix (Figs. 5.155). In the case of hardness the low variability may reflect the poor reliability of the measurement. The brittle condition of the cooking pot fragments is most likely due to the repeated contact with fire, inflicting thermal shocks during their use. The impermeability is imporant for containers, especially those for water. This may be partially reflected in their hardness.

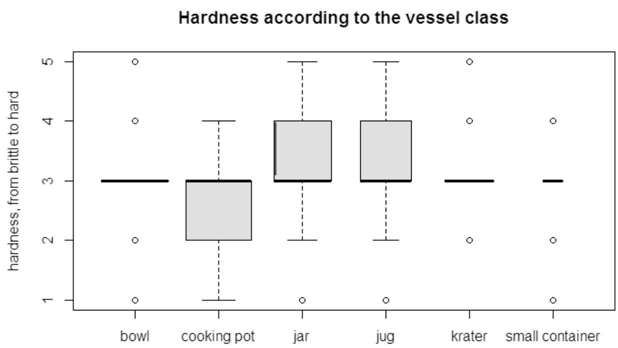
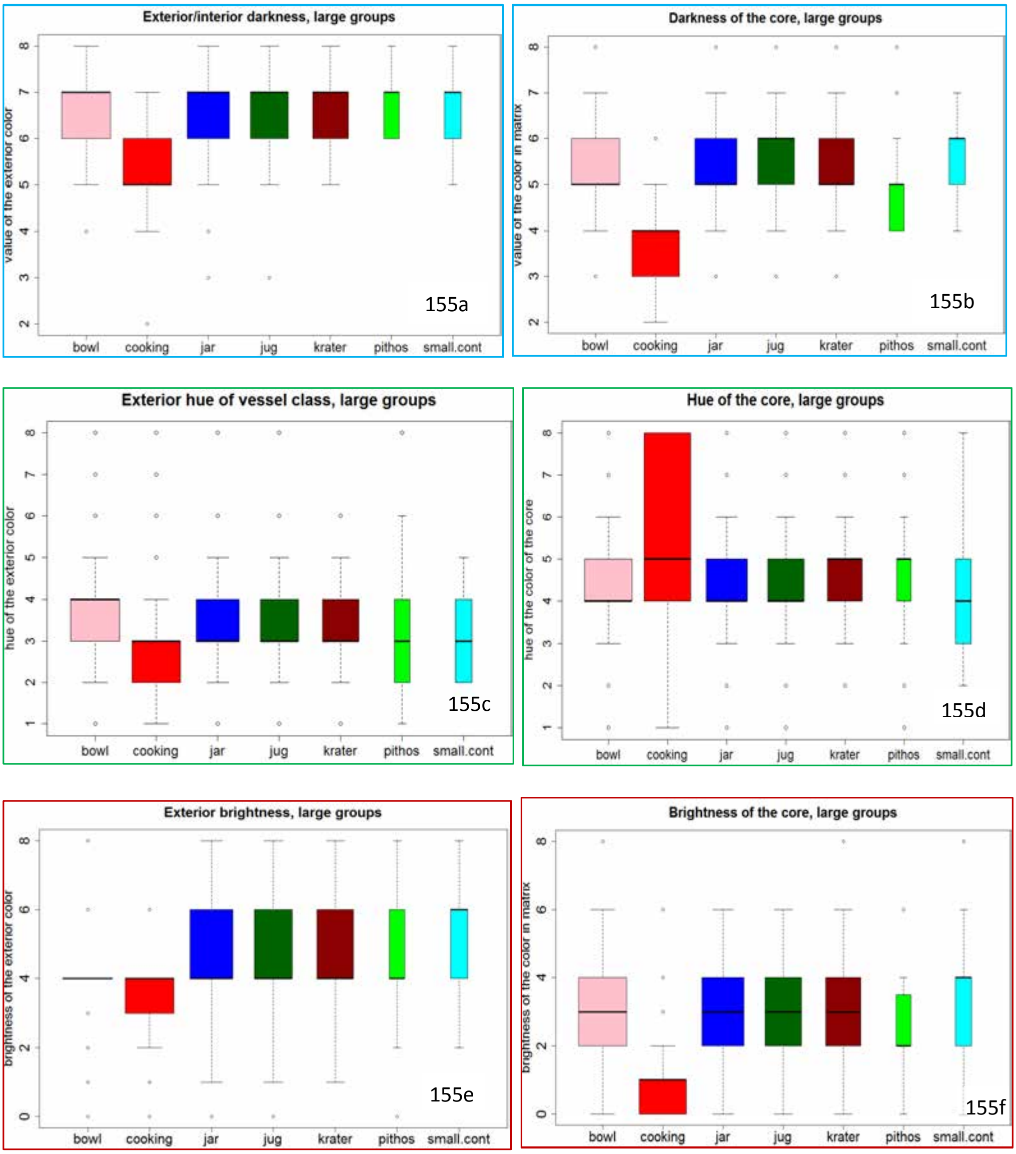
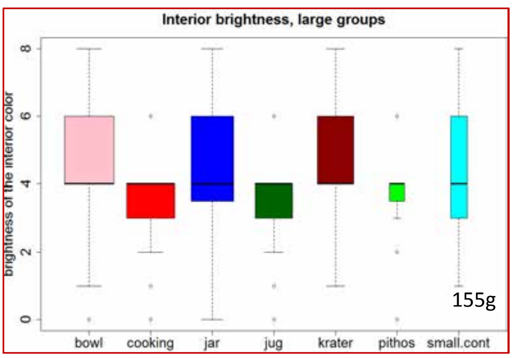


Fig. 5.154. Hardness was measured on a scale of 1–5; with 6 for unknown. I excluded observations with unknown hardness. Cooking pots deviate from other groups. The majority of all observations are of medium (3) hardness.

The color is a combined result of the properties of the clay, the firing process, and use. As indicated by the analysis of tempering materials, at least the preparation of the clay was distinctive for cooking pots. As there was more than one local clay source (see chapter 3), a difference in the used clay may be at least a partial reason for the difference in the vessel colors of cooking pots versus all other vessels, as the desired performance characteristics of the clays might differ. Dark color also adds to the ability to retain heat (Arnold 1985: 23). The cooking pots stand out from the other groups. They have low values for 'darkness' indicating a darker color. The low interior brightness (indicating grayish shades) of jugs and some of the other containers appears to be similar to that of cooking pots. This is due to the small opening of these vessels, preventing the inner surface from oxidizing during the firing.





Figs. 5.155a–g: Colors of different vessel classes. The uppermost boxplots in blue boxes portray the darkness 5a) on the surfaces (inner and outer were similar) and 5b) in the fresh cut matrix. Boxplots on the second row (green boxes) portray the hue (from green to yellow and red hues) 5c) on the surfaces (inner and outer) and 5d) in the fresh cut matrix. The three lowermost ones (red boxes) portray the brightness 5e) on the outer surface, 5f) in the fresh cut matrix and 5g) on the inner surface. The cooking pots constantly stand out from the other groups.

5.3.3 Statistical Modelling

Analytical model is a term used synonymously with computational or mathematical model. A model is a simplified representation of a more complex reality. A central question with all modeling is how large discrepancies are allowed between the model and the data (representing the reality), so that the model can be considered both understandable and useful (Orton 2004; Doran & Hodson 1975). The most useful models are the simplest that include all relevant aspects of the studied phenomenon. Focused and restricted phenomena are more prone to successful modeling (Lake 2001: 725–727). Typologies could be considered a focused study that would benefit from statistical modeling. The process itself can also be modeled as a series of decisions about variables, their metrics, and partitioning strategy (Orton 2004, Doran & Hodson 1975, 159-86). Creating a model enables the setting up of hypotheses and their testing against the archaeological data (Orton 2004).

There is no one certain analytical model behind my use of quantitative, heuristic tools. Each of them needs to be evaluated separately according to their individual interpretative value. When using quantitative approaches in archaeology, one may be disturbed by the defects in the data: the inaccessibility of many features of interest, and the gap between the material remains and the reality of human life. However, the same things can be said of social or psychological studies, and it is certainly possible to produce informative and insightful quantitative approaches, as so many aspects of the physical and social world do have some real patterning behind them. The use of any model requires one to be explicit about the process of data analysis, and thus it helps one rise above the realm of personal feelings, which are hard to provide explicit evidence for. The process of modeling thus helps to sharpen questions and refine thinking. The questions I have had in my mind included: *What kind of differences are there* between the different pottery assemblages at Tel Kinrot? How can we interpret the differences: as a sign of change in workmanship (the potter) reflected in clay preparation and style, or as innovations from contacts with other people in the wider region (reflected only in style)? If the material *seems to be uniform*, *is it really so*? And if yes, should we explain it by attributing it to the very limited time sequence for the phase of the Early Iron Age habitation? Statistical analyses can only help with questions relating to the kind and amount of differences or similarities in the data, but not with questions concerning the causes of them.

5.3.3.1 Searching inner structures with exploratory factor analyses

The concept behind factor analysis is that there are internal attributes, i.e. *factors,* in phenomena that cannot be directly observed, but which are in some sense more fundamental than the superficial attributes that can be measured, and these factors can be discovered by using the observed variables which reflect the more fundamental unobserved aspects behind them (Kabacoff 2011: 342; Coughlin 2013: 1; Fig. 5.156). Factor analysis has been developed and used especially in psychology, where it originated in the work of Charles Spearman's study of intelligence (Spearman 1904; Fabrigar et al. 1999). On a practical level, factor analysis is a tool for analyzing relationships between several variables. The aim is to find a set of common factors behind a complex set of associations among many variables (Coughlin 2013: 1).

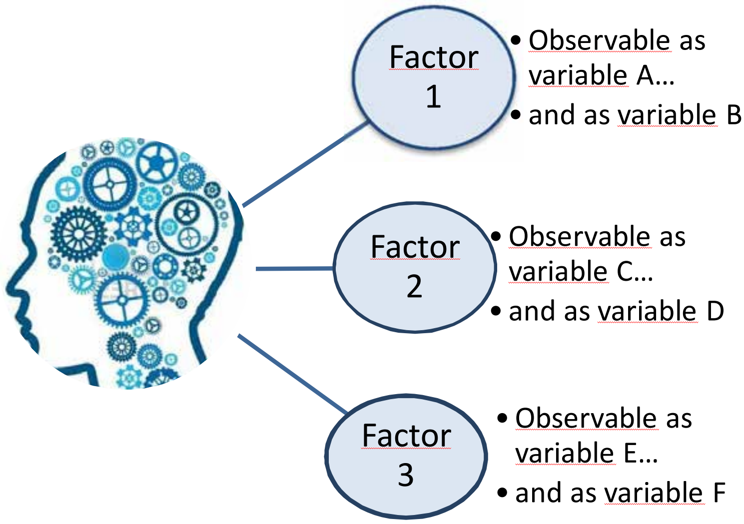


Fig. 5.156 The concept of factor analysis: a general phenomenon like personality is composed of general factors like temperament, intelligence, emotionality etc. The factors cannot be directly measured, but can be observed in some defined traits like contact activity with other people (temperament), scores in mathematic or linguistic tasks (intelligence), or reaction strength and speed to a stimulus (emotionality).

Measuring many variables for all studied items (like pottery shards) enables one to reach a more complete picture of the studied material than recording only few variables. As the phenomena of real life tend to be versatile, it is reasonable to try and uncover more facets of the phenomenon by measuring more variables that relate to it. However, recording more variables has the drawback of making things blurred and difficult to grasp. The complexity of the whole picture increases in relation to the number of variables, but the complexity increases quicker than the number of variables. This is because it is not only the information of the variable itself that is involved, but also the relationships between the variables (i.e. interactions).

Even with 20 variables measured for the Tel Kinrot pottery (Fig. 5.142), there are 190 interactions that one could (and should) look at. In practice the number is even higher, because there are sub-sets (different vessel groups or types, or the same types occurring in different chronological phases) within the material that may have different interactions than other sub-sets. The conversion of colors into three different parts (hue, brightness, and darkness) increases the amount of variables, while it at the same time it enabled me to treat them as a variable of ordinal scale instead of categorical scale only. This conversion made it easier to achieve an overview of the variability of the colors, and also to visualize their distributions over different vessel groups. As in the case of the Tel Kinrot ceramics several variables can be considered at least of ordinal scale, I considered it worthwhile to try to reveal the latent structuring in the data, which I assumed would be related to vessel form and function (at least the cooking ware might differ from other common wares), as well as clay properties and clay processing, foremost when effected by adding temper.

An important goal of many multivariate analyses is to reduce the dimensionality of the data. This is especially desirable in the exploratory stages of any study, both to provide an understandable overview and to suggest fruitful lines for model building (Bartholomew 1980: 293; Hair et al. 1998: 87–90). This may feel counter-intuitive: I first added recorded features in order to have more detailed information, but then faced the need to reduce this exhausting amount of information. However, this process has the potential to present a more detailed and rich picture of the material, one that is easier to grasp than the smaller set of 20 originally measured variables. Common methods for reducing many dimensions (measured as several variables) into a few are principal component analysis (PCA) and factor analysis (FA). Principal component analysis is appropriate for data reduction without the goal of modelling a structure in the data, while factor analysis is a more proper approach for a study where some pattern in the data is being searched for (Fabrigar et al 1999: 275). Both techniques (PCA and FA) are based on correlations between different measured variables, and therefore require that the variables have been measured on a continuous scale, or at least on an ordinal scale (Bartholomew 1980: 293; Shennan 1994: 265–305; Metsämuuronen 2001: 17–19, 29).

However, the need to reduce the dimensionality is not less urgent within fields where many phenomena can only be measured on an ordinal scale or classified into un-ordered categories, and there has been a continuous effort since the late 1960's to extend the reach of factor analyses to include categorical data (McDonald 1969; Bartholomew 1980: 294). Categorical variables can be transformed into so called *dummy*-variables, only resulting in values of 0 or 1 for absence and presence. However, such categorical variables may be difficult to interpret in the results, especially if they have many classes. Because the categorical variables of vessel classes, types, and rim forms all have more than ten classes, I did not include them in the factor analysis at all, while I did include the direction of the rim part (three classes) and tempering materials. For the tempering materials, I combined the relatively rare and somewhat vaguely defined mineral tempering groups of flint, red grits, dark grits, and sand into one class of mixed minerals. I run the same analyses with all the sub-sets of data, both with and without the tempering materials and rim-directions, as dummy variables and compared the results. Some of the variable bundles were stable across this difference, while the variables that related to the quantity and particle size of the tempering materials became more prominent in the results when I included the tempering materials in the analyses. Thus, the interpretative value of the factor solutions generally was improved by adding the tempering materials as dummy-variables. In addition, I took the vessel classes into consideration by making factor solutions for different vessel classes separately. Again, some variables were constantly associated across most vessel groups, indicating a stable association between them.

Exploratory factor analysis aims at reducing many variables that somehow reflect a common theme into a few dimensions that would be easier to interpret. These shared themes are the hypothetical, unobserved aspects behind the measured variables called *factors*. In factor analysis, the interactions between all variables are used simultaneously (Hair et al. 1998: 90–91). In mathematical terms, a factor is a linear combination of the observed variables, and they are formed so that the common variation of variables in the same factor is as large as possible, and the constant association with the variables of the other factors is as small as possible. This maximizes the explanative potential of the factors for the whole set of variables used in the analyses (Hair et al. 1998: 91).

Based on the earlier pottery studies and descriptions in section 5.2, as well as the single and pairwise inspections of variables above (section 5.3.1), I expected that the relationships between single variables would be different at least in some vessels classes, and that the factor structures would differ accordingly. If differing groups are expected in the sample, it is usually advised that separate factor analyses be done for the differing groups (Hair et al. 1998: 100). With this in mind, I made factoring solutions for different sub-groups separately. However, I assumed that at least some of the sub-groups would be close to each other, and at least some variables would also make stable patterns over different sub-groups. Therefore, I decided to run similar analyses first for the whole data set, and then for different sub-groups, first separated on a more general level into open and closed vessel types and then for vessel classes (bowls, jars etc.) separately.

The model between factors and variables was presented as a measurement model in Fig. 2.6. The model is a tentative one, so I chose to use an *exploratory* factor analysis instead of a confirmatory one, which would have required an existing, well understood model to test against (see Coughlin 2013: 24). Exploratory factor analysis is a data-driven and flexible method, especially appropriate for contexts where several alternative models exist and there are no strong theoretical or empirical restrictions as to the number of factors, or specific information about the relationship between the latent factors and measured variables. The confirmatory and explorative approaches are often used in conjunction with each other, so that the exploratory approach is used in the initial study in order to specify a model that can, in a subsequent phase, be tested as a part of a confirmatory factor analysis (Fabrigar et al 1999: 276–277).

Because factor analysis is based on associations between variables, one first needs to have a measure of that association. The most common ways to establish this are through correlations and co-variance, both of which can be calculated for continuous variables. For ordinal variables, one can use the rank correlation coefficient, while associations between nominal variables can only be calculated as co-occurrences. As pure co-occurrences are not a suitable measure of association for the factor analysis, such variables can be integrated in the analyses as 0-1 categories. The applied measure must be the same across all the variables. Even though several variables in the Tel Kinrot material are ordinal, I decided to use correlations (Pearson's Product Moment Correlation Coefficient). Correlations have been proved to be robust even against slight violations concerning distributional assumptions, and also fit data analysis with coarse measurement scales, such as ordinal variables, better than other association measures (Coughlin 2013: 31–35). The factor analyses I have made are all based on correlation matrices. If I would have used rank correlations, I would have lost a considerable amount of information on the variables that are continuous.

The correlations in Fig. 5.157 are counted for all vessel groups when they were treated together, when the categorical dummy-variables of the nominal scale are not included. I made similar correlation matrices for open and closed vessel groups separately, and for bowls, jars, cooking pots, jugs, kraters, pithoi, and small closed vessels separately, as I supposed that the relationships between the variables might be different for different vessel classes (or even vessel types). The correlation matrices for the different sub-sets are included in Appendix 5P. It was clear already from the several correlation matrices that color variables correlated with each other, and the diameter and the two thickness variables measured from the rim part correlated with each other, while other associations were less apparent.

Correlation matrix

	Diam	R_max	Bel_r	Firin	Temp_q	Temp_s	Tem2_q	Tem2_s	stratu	hue_cor	hue_ex	hue_in	val_cor	val_ex	val_in	chr_cor	chr_ex	chr_in
Diam	1.00	**0.45**	*0.352*	−0.132	0.14	0.09	−0.20	−0.16	0.021	0.191	−0.183	−0.19	*−0.38*	*−0.35*	−0.31	−0.26	−0.103	−0.049
R_max	0.45	1.00	**0.710**	−0.023	0.13	0.09	0.02	0.03	−0.095	0.153	−0.114	−0.10	−0.23	−0.14	−0.11	−0.19	0.040	0.016
Bel_r	0.35	0.71	1.000	−0.010	0.05	0.058	0.08	0.10	−0.056	0.038	0.004	0.04	−0.04	0.04	0.09	−0.01	0.040	0.006
Firin	−0.13	−0.02	−0.010	1.000	−0.12	−0.035	0.096	0.11	−0.035	0.004	0.045	0.06	0.11	0.15	0.13	0.02	0.062	0.043
Temp_q	0.14	0.13	0.051	−0.119	1.00	−0.05	−0.07	0.08	−0.037	0.024	−0.062	−0.07	−0.10	−0.10	−0.09	−0.02	0.057	0.079
Temp_s	0.09	0.09	0.058	−0.035	−0.05	1.000	7e−04	−0.04	−0.024	0.095	−0.059	−0.05	−0.11	−0.15	−0.11	−0.12	−0.033	−0.065
Tem2_q	−0.20	0.02	0.078	0.096	−0.07	7e−04	1.00	**0.52**	−0.123	0.016	0.158	0.18	0.24	0.27	0.26	0.08	0.108	0.073
Tem2_s	−0.16	0.03	0.096	0.106	0.08	−0.04	0.52	1.00	−0.062	−0.095	0.073	0.09	0.25	0.26	0.26	0.17	0.150	0.129
str	0.02	−0.09	−0.056	−0.035	−0.04	−0.024	−0.12	−0.06	1.000	−0.069	−0.086	−0.05	−0.03	−0.09	−0.10	0.05	−0.004	−0.005
hue_cor	0.19	0.15	0.038	0.004	0.02	0.095	0.016	−0.09	−0.069	1.000	0.012	0.04	**−0.43**	−0.20	−0.19	**−0.77**	−0.136	−0.123
hue_ex	−0.18	−0.11	0.004	0.045	−0.06	0.158	0.158	0.07	−0.086	0.012	1.000	**0.68**	*0.36*	**0.55**	**0.44**	0.12	**−0.571**	*−0.375*
hue_in	−0.19	−0.10	0.041	0.061	−0.07	−0.05	0.18	0.09	−0.053	0.041	0.682	1.00	0.32	**0.44**	**0.43**	0.06	*−0.371*	**−0.598**
val_cor	−0.38	−0.23	−0.040	0.105	−0.10	−0.11	0.24	0.25	−0.030	−0.431	0.358	0.32	1.00	**0.63**	**0.63**	**0.64**	0.078	0.055
val_ex	−0.35	−0.14	0.036	0.147	−0.10	−0.15	0.27	0.26	−0.086	−0.202	0.548	0.44	0.63	1.00	**0.76**	*0.37*	−0.089	−0.048
val_in	−0.31	−0.11	0.092	0.134	−0.09	−0.11	0.26	0.26	−0.098	−0.194	0.443	0.43	0.63	0.76	1.00	*0.36*	−0.026	−0.044
chr_cor	−0.26	−0.19	−0.012	0.018	−0.02	−0.12	0.08	0.17	0.047	−0.769	0.120	0.06	0.64	0.37	0.36	1.00	0.164	0.168
chr_ex	−0.10	0.04	0.040	0.062	0.06	−0.033	0.108	0.15	−0.004	−0.136	−0.571	−0.37	0.08	−0.09	−0.03	0.16	1.000	**0.582**
chr_in	−0.05	0.02	0.006	0.043	0.08	−0.065	0.073	0.13	−0.005	−0.123	−0.375	−0.60	0.06	−0.05	−0.04	0.17	0.582	1.000

Fig. 5.157. Correlations between continuous and ordinal variables, when all vessel classes are included. Correlation at or over 0.45 are **bolded** and those between 0.35 and 0.445 are in *italics.*

The factor model needs to be fit to the data. This fitting means that the factors are *extracted* from the correlation matrix by a certain method. There are several different extraction methods, each with slight differences in the calculations. The most common extraction methods are Principal Axis, Maximum Likelihood (ML), and Ordinary Least Squares (OLS) (Fabrigar et al. 1999: 277; Coughlin 2013: 40–46). The Principal Axis factoring method does not enable a calculation of confidence intervals, fit estimation of the model, or testing of the significance of the solutions (Fabrigar et al. 1999: 277; Coughlin 2013: 41). Maximum Likelihood factor analysis allows the researcher to calculate fit indices as well as confidence intervals for the *factor loadings* (see below), but is sensitive to violations of the assumption of multi-normal distribution, i.e. that all of the used variables and all of their linear combinations have a normal distribution. If the assumption of normality is not met, the results may be distorted (Fabrigar et al. 1999: 277–279; Coughlin 2013: 41–46). The Ordinary Least Squares method minimizes the sum of the squared differences between the model and the actual data. For this reason, the method is also referred to as MINRES (Couglin 2013: 44). Fit measures and information for estimating the parameters of reliability (like calculating confidence intervals) are available for the OLS, but it does not assume normality (Briggs & MacCallum 2003: 28–29; Coughlin 2013: 44–46). The different methods yield similar results in many research contexts, while they may significantly differ in studies with variables of coarse scale and where distributions are not normal (Fabrigar et al 1999: 277: Briggs & MacCallum 2003: 25–26).

According to studies including both empirical and simulated data, the OLS method has been attested a better method for discovering weak factors (Briggs & MacCallum 2003: 25–26; 31–54). In addition, because OLS is not based on any assumptions about the (normal) distribution of the variables, it is capable of taking into account the categorical variables (Briggs & MacCallum 2003: 28). Because several of the variables within the Tel Kinrot pottery study portray skewed distributions and the data set, including continuous, ordinal, and categorical variables, I have preferred the Ordinary Least Squares method for extracting the factors (which is also the default option in R statistical software). For a few sub-sets I also calculated a solution with the Maximum Likelihood extraction method, which did not differ significantly from the solution provided by the OLS.

An important decision that affects the results is the *amount of extracted factors*. The number of factors effects both the variance accounted for and the pattern of the solution. The pattern indicates which variables load together from which variables they differ from. *Eigenvalues* represent the percentage of variance accounted for (explained by) the factor. There are two common aids for determining a proper amount of factors, both related to the amount of total variance accounted for by each factor and presented graphically by a scree-plot (see Fig. 5.158). The scree-plot presents a figure where the factors are plotted according to their *eigenvalues*. The factors are presented by dots, so that the first one is in the upper left corner, and the following factors are placed on its right side. The first factor, per definition, has the highest eigenvalues, because it is extracted first, and the following factors will take over the residual variance (the variance that is left when the variance accounted for by the first factor is removed).

There are two common ways of using the scree-plot for determining the number of factors to extract. The more mechanical one is the Kaiser criterion: a value greater than 0 for the eigenvalue indicates that one component explains more than its fair share of variance, and all factors that have eigenvalue over 0 may be kept (Kabacoff 2011: 335, 344). However, this mechanical rule is arbitrary, and tends to lead to over-factoring, i.e. extracting too many factors (Fabrigar et al. 1999: 278). A better option is to look at the form of the scree plot. The steep slope indicates that the added factor increases a fair amount of explanative power. Usually there is a relatively clear point where the added factor does not increase the variance explained by the model to any significant amount. At this point, there is an "elbow" in the figure that indicates a number of factors that might be reasonable to retain (Kabacoff 2011: 335). This approach has proven generally practical, even though it includes a subjective decision as to where the "clear point" may be found (Fabrigar et al. 1999: 279). When selecting a proper number of factors one is in the situation of choosing between simpler (fewer factors) and more complex (more factors) models, and the aim is to choose a model that is as simple as possible with as much explanative power as possible: "a model that explains the data substantially better than simpler alternative models but does as well or nearly as well as more complex alternative models." (Fabrigar et al. 1999: 279) This is an issue that needs to be considered for substantive reasons as well as for statistical fit indices. If similar patterns can be attested over multiple comparative data sets, it may indicate that a proper number of factors has been found (Fabrigar et al. 1999: 279–281). The evaluation of a proper number of factors therefore requires trial of several solutions and their comparisons.

The results of the factor analysis include many indicators that can be used to evaluate how well the factors extracted compress the data and present a useful picture of the possible latent factors. First, there is the *factor pattern matrix.* It is a matrix of standardized regression coefficients between the variables and the formed factors. Regression coefficients are weights for predicting the variables from the factors (Kabacoff 2011: 346). The first columns after the variable names represent the correlations (also called *loadings*) of each variable with the first formed factor, the second column represents the loadings of the variables on the second factor, and so on. The loadings are the key to each factor's interpretation (Metsämuuronen 2001: 38–39; Kabacoff 2011: 337, 346). Loadings below ±0.3 are often considered insignificant, and the higher the absolute value of the loading the more important the variable is for the interpretation of the factor (Hair et al. 1998: 111). The more consistent the observed variable-bundles are, and the more differentiated from other bundles across the data, the more stable are the connections between the variables. Such stability over different solutions is insightful for understanding the phenomenon and the reliability of variables.

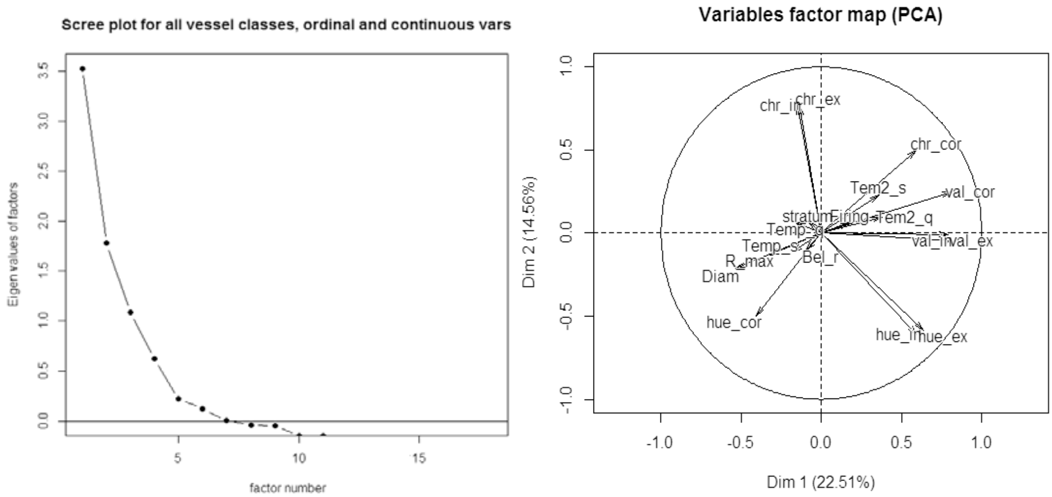
In order to reach a solution that is easy to interpret, the factors are usually *rotated*. This is like looking at a bunch of branches from different angles, in order to see from what angle the branch bundles form the clearest patterning – where some of them bundle together and separate from the other bundles. The presented factor loadings thus do not portray original factors, but rotated ones. There are two major options: orthogonal rotation, where factors are kept at right angles to each other and thus uncorrelated, and oblique rotation, where correlations between the factors are allowed (Fabrigar et al. 1999: 281–282; Metsämuuronen 2001: 30–31, 38; Kabacoff 2011: 344–347). In the oblique rotation, variables may load on several factors, which may complicate the interpretation of the factors. However, the correlations between the underlying factors may well be something inherent to the phenomenon. In such cases, it may provide a more realistic model of the data (Fabrigar et al. 1999: 282; Metsämuuronen 2001: 31; Kabacoff 2011: 347). The possible correlations between factors are also potentially informative and insightful (Fabrigar et al. 1999: 282). In theory, there is no reason for the factors behind the pottery production to be unrelated to each other (rather, the contrary!), and I therefore used oblique rotation (oblimin-method). However, the correlations between the factors were low, and the orthogonal rotation (with varimax-method) produced almost exactly the same solution as the oblique rotation (I checked it for three and four factor solutions of all vessel classes analyzed together). The correlations between the factors can be seen in the *factor inter-correlation matrix* of the produced solution (see also Kabacoff 2011: 346). I have not included these matrices in the figures below, as in the results of the Tel Kinrot ceramics the factors generally did not correlate with each other in significant ways. There were a few solutions where two factors correlated. I have indicated these solutions in the following factor solutions of Tel Kinrot material. These solutions were not optimal in their interpretative value.

In the factor pattern matrix, there is a column after factor loadings (entitled *h2*) that contains *communalities*. They indicate the sum of the squared factor loadings for all factors for a given variable (presented by the row). Communality measures the share of variance in a variable that is explained by all the extracted factors together (Kabacoff 2011: 337). A low communality indicates the variable is poorly represented in the factor solution, and the solution can be considered distorted (Hair et al. 1998: 113–114; Fabrigar et al. 1999: 274). Reasons for low communalities are twofold: they derive either from low reliability or low validity of a variable, or both. If the *validity* of a variable is low, it indicates that the variable does not really measure what it should, and it is not really related to the phenomenon of interest, but is actually irrelevant for it – in such a case it has little to do with other variables in the model (Fabrigar et al. 1999: 274). *Reliability* is the ratio of the true variance to the variance that is observed. Low reliability may occur for a relevant variable, if the measurements are inaccurate and include a lot of variance due to random errors (Fabrigar et al. 1999; Vehkalahti 2000: 1–3). The amount of variance *not* accounted for by the components (i.e. 1–h2) represents the independent "noise" included in the variance of each variable included in the model (Revelle in prep: chapter 6).

Below the loadings and communalities, there are figures concerning the factors and their explanative potential. First, the sum of squared (SS) loadings indicate the eigenvalues of each factor. A sharp decline in the eigenvalue is an indicator of a small amount of explanative power brought about by the added factor. Proportion of the variance (Var) refers to the amount of variance accounted for by each factor, while the cumulative variance simply counts the variances accounted for together, and gives the value for the overall explanation of the solution. What counts as proper variance explained differs from one field to another: in the natural sciences, the factors are often extracted until the solution accounts for 0.95 of the variance, while in the social sciences, with their less precise measurement possibilities, a solution that accounts for 0.6 of the variance is usually considered good (Hair et al. 1998: 104). The lower the variance accounted for, the more there is variation in the material that remains unexplained. The lowest row indicates the proportions of each factor's explanation in the model. There are many measures for goodness of fit. The root mean square of residuals (RMSR) is a measure of fit based on the amount of variance that is not explained by the factor solution. It is a measure of the difference between values predicted by the model and the values actually observed. Closer to zero is better, but because its absolute value is dependent on the values of observed variables, no rules of thumb can be given for a level that would be good in general (Metsämuuronen 2001: 49). However, when comparing factor solutions of the same variables this is not a problem. Smaller values are better, and for the purposes of comparing the solutions of the same variables it is enough to be able to order the solutions.

Although exploratory factor analysis is a heuristic device, it can be used to evaluate the adequacy of used dimensions. Despite the available measures of the goodness of the model, the quality and meaning of the factor solutions is dependent on the conceptual basis of the variables included (Hair et al. 1998: 97). The consistency of the common variance between different variables indicates the strength of their association. These patterns can be used to evaluate the supposed model of factors (see Fig. 2.6) behind the varying details in the material.

<u>Factor solutions for all vessel classes</u>



Figs. 5.158 a) Scree plot and b) variables factor map of factors for all vessel classes with continuous and ordinal variables included in the factor model.

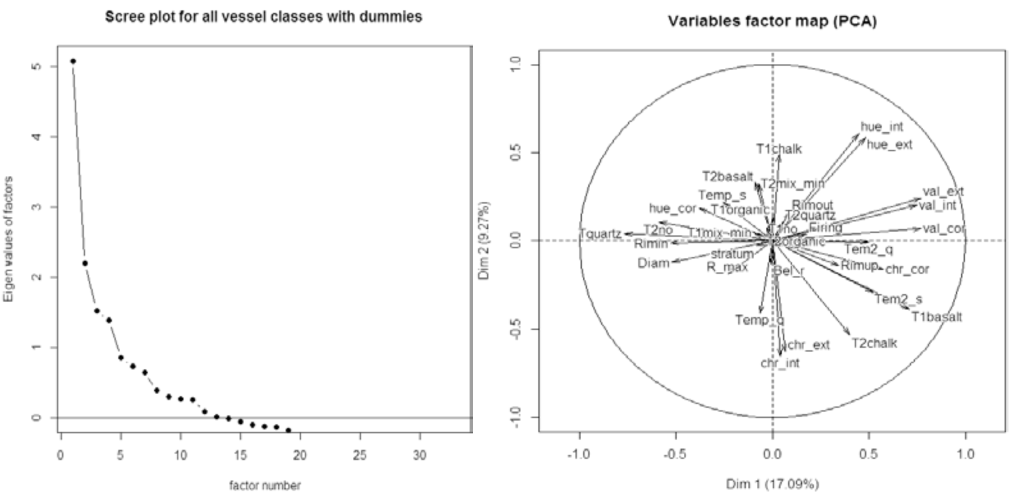
The scree plot in Fig. 5.158a for all pottery classes treated together indicates that five factors is the point where one can see a turn in the line representing the explanative power of the factors. If one follows the general rule of keeping only factors that have an eigenvalue over 0, the plot would indicate a proper number of factors at seven (Kabacoff 2011: 335, 344). The scree plot gives the research only a starting point, and the final decision should always lay on the interpretative value of factor loadings. Therefore, I tried several different solutions, which is the recommended procedure (e.g. Hair et al 1998: 105; Kabacoff 2011: 339). I usually performed four to five solutions and then compared the results, especially the interpretations of the factors in them. The variables factor map (Fig. 5.158b) is a two-dimensional presentation of the variables' positions in the model. The length of the arrows reflects the dominance of a variable in the model, and the position of the variables around the origin reflects how close they are to each other. The variables factor map in Fig. 5.158b indicates that the color variables with long arrows are the features that dominate the factor solutions. Diameter also stands out as a dominant feature, while especially stratum and the quantity and particle size of the main temper are situated close to the origin, indicating a minor role in the factor pattern. The variables of interior and exterior surface colors brightness (chroma) relate closely to each other, as well as the darkness (value) of the surfaces and the hue of the surfaces, indicated by the arrows having a very similar direction. The opposite direction of the hue and chroma of the color in the core also indicates a close relationship, but a negative one.

The factor solutions with three, four, and five factors are included in the table in Fig. 5.159. I also ran a solution with only two factors, but it did not provide a very interpretative solution: the 2-factor solution was strongly dominated by the color variables. The first factor was dominated by the darkness and the colors in the core, while of the other variables only the diameter loaded on the same factor (0.46), and weak loadings of the quantity (0.30) and particle size (0.34) of the secondary temper appeared on the first factor as well.

Factor pattern matrices for all vessels analyzed together (three, four and five factor solutions)																
used variables	3 factor solution				4 factor solution					5 factor solution						
	MR1	MR3	MR2	h2	MR4	MR2	MR1	MR3	h2	MR2	MR4	MR1	MR3	MR5	h2	
	darkn. core 2temper	surf.	size	comm.	darkn. 2temper	surf.	core	size	comm.	darkness	surface	core col.	size	second temper	communality	
Diam	*−0.39*	0.01	*0.42*	0.367	*−0.39*	−0.11	−0.03	*0.45*	0.393	−0.29	−0.07	−0.04	*0.46*	−0.16	0.393	Diam
R_max	−0.10	−0.04	**0.86**	0.778	−0.05	0.03	−0.05	**0.85**	0.750	−0.05	0.03	−0.05	**0.86**	0.02	0.771	R_max
Bel_r	0.13	−0.01	**0.84**	0.695	0.11	−0.01	0.07	**0.85**	0.707	0.11	−0.01	0.06	**0.85**	0.02	0.705	Bel_r
Firing	0.15	−0.01	0.00	0.022	0.24	0.10	−0.10	−0.03	0.048	0.20	0.09	−0.09	−0.03	0.07	0.044	Firing
Temp_q	−0.07	−0.07	0.11	0.026	−0.09	0.05	0.02	0.12	0.027	−0.08	0.05	0.03	0.12	−0.03	0.028	Temp_q
Temp_s	−0.16	0.03	0.07	0.030	−0.12	−0.04	−0.06	0.07	0.031	−0.17	−0.06	−0.04	0.07	0.06	0.037	Temp_s
Tem2_q	*0.33*	0.01	0.11	0.116	**0.50**	0.17	−0.16	0.06	0.206	−0.07	−0.02	−0.02	0.00	**0.88**	0.727	Tem2_q
Tem2_s	*0.38*	−0.10	0.13	0.142	*0.45*	0.23	−0.04	0.09	0.198	0.06	0.10	0.05	0.05	**0.58**	0.393	Tem2_s
stratum	−0.07	−0.06	−0.11	0.019	−0.18	−0.03	0.13	−0.08	0.037	−0.11	−0.01	0.10	−0.08	−0.11	0.038	stratum
hue_cor	**−0.50**	*0.30*	0.09	0.303	0.12	0.00	**−0.88**	0.00	0.708	0.08	−0.02	**−0.81**	0.01	0.05	0.611	hue_cor
hue_ext	*0.32*	**0.73**	−0.01	0.715	*0.43*	**−0.63**	0.00	−0.02	0.704	*0.36*	**−0.64**	0.02	−0.02	0.05	0.691	hue_ext
hue_int	0.26	**0.72**	0.01	0.653	*0.40*	**−0.62**	−0.04	0.00	0.649	0.25	**−0.68**	0.00	0.00	0.13	0.668	hue_int
val_cor	**0.84**	−0.03	−0.07	0.711	**0.59**	0.02	*0.40*	−0.08	0.695	**0.54**	0.01	*0.39*	−0.08	0.07	0.679	val_cor
val_ext	**0.75**	0.24	0.03	0.689	**0.81**	−0.08	0.05	−0.01	0.731	**0.86**	−0.05	0.00	−0.01	0.01	0.781	val_ext
val_int	**0.76**	0.18	0.08	0.644	**0.81**	−0.02	0.05	0.03	0.686	**0.85**	0.01	0.00	0.04	0.01	0.724	val_int
chr_cor	**0.69**	−0.27	−0.08	0.498	0.11	0.03	**0.88**	0.01	0.864	0.02	−0.01	**0.99**	0.01	0.02	0.995	chr_cor
chr_ext	0.22	**−0.73**	0.05	0.525	0.15	**0.79**	0.02	0.02	0.595	0.11	**0.75**	0.03	0.01	0.11	0.564	chr_ext
chr_int	0.21	**−0.71**	0.03	0.496	0.14	**0.77**	0.02	−0.01	0.569	0.18	**0.79**	0.01	−0.01	0.02	0.585	chr_int
	MR1	MR3	MR2		MR4	MR2	MR1	MR3		MR2	MR4	MR1	MR3	MR5		
SS loadings	3.33	2.38	1.73		2.89	2.14	1.86	1.71		2.39	2.15	1.90	1.73	1.27		
Proportion Var	0.18	0.13	0.10		0.16	0.12	0.10	0.09		0.13	0.12	0.11	0.10	0.07		
Cumulative Var	0.18	0.32	**0.41**		0.16	0.28	0.38	**0.48**		0.13	0.25	0.36	0.45	**0.52**		
Proportion Expl. (Prop. Expl.)	0.45	0.32	0.23		0.34	0.25	0.22	0.20		0.25	0.23	0.20	0.18	0.13		
Root Mean Square of Residuals (RMSR) is 0.07					RMSR is 0.04					RMSR is 0.03						

Fig. 5.159 Rotated factor solutions (pattern matrices) for all vessel classes together, when only continuous and ordinal variables are included in the model. Correlations (loadings) of 0.5 or more are **bolded**, those of 0.3–0.49 are in *italics* and those below 0.2 are printed in gray.

The variables related to color are most stable over different factor solutions: exterior and interior surfaces of color hue (the tone of the color from blue/green to red and yellow) and brightness (chroma) always load on the same factor with each other. The value (from dark to light) loads together with all the color variables of the core in two and three factor solutions, and the secondary tempering material also loads with them, though not very strongly (however, often 0.3 is already considered as a fair loading) (Metsämuuronen 2001: 34). In the four and five factor solutions, the color of the core all load together on one factor, while the darkness of the surfaces and core occupy one factor. The darkness in the core loads both with the darkness on the surfaces and with the other color variables of the core. The size related variables of diameter, rim thickness, and thickness of the wall below the rim also form a bundle of elements that co-vary. The quantity and particle size of the secondary tempering material has fair loadings, and in the five factor solution they dominate the fifth factor. The time related variable of stratum never significantly correlates with other variables. However, it was retained in the analysis because this is an important observation regarding the chronological aspects usually related to pottery studies. The variable related to hardness (labeled as firing) did not load on any factor either, which is due to its generally low variability and/or the coarse way of measuring the hardness (see Fig. 5.155 for a box-plot of it). Also, the low variability of the amount and particle size of the main temper is the most likely reason for these variables not to load on any of the factors in any of the solutions. However, the picture changes if one also includes the tempering materials in the model (as dummy variables).



Figs. 5.160 a) Scree plot and b) variables factor map of factors for all vessel classes with continuous and ordinal variables, as well as tempering material and direction of the rim part as 0-1 variables included in the model.

Factor pattern matrices for all vessels analyzed together (three, four and five factor solutions) with dummy-variables of tempering material and direction of the rim part

used variables	3 factor solution				4 factor solution					5 factor solution						used variables
	MR1 diam. darkn. core temper	MR2 surf. color	MR3 thick-ness (temper)	h2	MR1 size core	MR4 2tem-per	MR2 surf. color	MR3 1.tem-per	h2	MR1 darkn. core	MR4 2te-mper	MR2 surf. color	MR5 1te-mper	MR3 size rim dir.	h2	
Diam	**-0.64**	0.05	*0.33*	0.463	**0.63**	-0.15	-0.03	0.14	0.464	*-0.31*	-0.27	-0.03	-0.07	**0.50**	0.519	Diam
R_max	*-0.41*	0.14	**0.56**	0.435	**0.73**	*0.30*	-0.02	0.19	0.532	-0.10	0.02	-0.05	0.00	**0.84**	0.738	R_max
Bel_r	-0.18	0.19	**0.52**	0.305	**0.55**	*0.38*	0.08	0.20	0.385	0.12	0.06	0.04	0.03	**0.82**	0.666	Bel_r
Firing	0.19	0.02	-0.04	0.037	-0.09	0.21	-0.01	-0.10	0.060	0.03	0.24	-0.01	0.08	-0.07	0.067	Firing
Temp_q	-0.15	-0.15	**0.50**	0.285	0.19	-0.23	-0.02	**0.62**	0.406	-0.10	-0.21	-0.01	**-0.61**	0.12	0.412	Temp_q
Temp_s	-0.23	0.10	-0.17	0.094	0.18	0.05	-0.02	*-0.32*	0.143	-0.17	0.03	-0.02	*0.32*	0.09	0.147	Temp_s
Tem2_q	*0.42*	0.15	0.20	0.273	0.10	**0.85**	-0.02	-0.15	0.651	-0.09	**0.88**	-0.01	0.10	0.04	0.718	Tem2_q
Tem2_s	*0.44*	-0.03	*0.42*	0.414	0.04	**0.66**	-0.09	0.23	0.533	-0.03	**0.72**	-0.08	-0.28	0.01	0.628	Tem2_s
stratum	0.00	-0.16	-0.17	0.054	-0.19	-0.23	-0.10	-0.03	0.077	0.09	-0.21	-0.10	0.02	-0.15	0.078	stratum
hue_cor	**-0.53**	0.34	0.19	0.365	**0.64**	0.09	0.18	-0.13	0.422	**-0.77**	0.25	0.21	-0.03	0.05	0.580	hue_cor
hue_ext	0.29	**0.75**	0.01	0.697	-0.09	0.06	**0.84**	0.06	0.760	0.15	0.03	**0.83**	-0.04	-0.01	0.760	hue_ext
hue_int	0.25	**0.77**	0.01	0.696	-0.04	0.11	**0.82**	0.00	0.725	0.08	0.09	**0.82**	0.01	0.00	0.728	hue_int
val_cor	**0.79**	0.07	-0.09	0.640	**-0.62**	0.24	0.20	0.12	0.658	**0.74**	0.11	0.17	0.00	-0.08	0.706	val_cor
val_ext	**0.68**	*0.37*	0.03	0.662	*-0.39*	0.33	*0.46*	0.11	0.668	**0.54**	0.22	*0.43*	-0.02	0.01	0.685	val_ext
val_int	**0.67**	*0.33*	0.06	0.610	*-0.35*	*0.36*	*0.41*	0.11	0.611	**0.56**	0.23	*0.38*	0.00	0.07	0.643	val_int
chr_cor	**0.69**	-0.26	-0.14	0.507	**-0.70**	0.04	-0.09	0.17	0.555	**0.87**	-0.14	-0.13	0.00	-0.04	0.708	chr_cor
chr_ext	0.24	**-0.70**	0.08	0.531	-0.18	0.29	**-0.75**	0.06	0.631	0.23	0.25	**-0.76**	-0.01	0.03	0.639	chr_ext
chr_int	0.21	**-0.71**	0.11	0.538	-0.18	0.22	**-0.74**	0.12	0.596	0.23	0.18	**-0.74**	-0.07	0.02	0.603	chr_int
T1basalt	**0.65**	-0.12	*0.42*	0.658	*-0.35*	0.22	0.06	**0.61**	0.716	*0.48*	0.17	0.05	**-0.54**	-0.01	0.716	T1basalt
T1chalk	0.09	0.25	*-0.48*	0.301	-0.09	0.28	0.09	**-0.67**	0.466	0.06	0.24	0.07	**0.67**	-0.04	0.479	T1chalk
T1quartz	**-0.72**	-0.10	-0.15	0.589	*0.34*	**-0.52**	-0.14	-0.15	0.604	*-0.48*	*-0.44*	-0.12	0.07	-0.02	0.606	T1quartz
T1mix_m.	-0.12	0.06	0.02	0.016	0.14	0.04	0.02	-0.06	0.022	-0.21	0.09	0.03	0.01	-0.03	0.039	T1mix_m.
T1no_tem	0.00	-0.01	-0.15	0.023	-0.01	0.11	-0.07	-0.23	0.056	-0.05	0.13	-0.07	0.20	-0.06	0.057	T1no_tem
T1organ.	-0.04	0.17	0.00	0.028	0.15	0.19	0.08	-0.15	0.066	0.04	0.08	0.07	0.22	0.23	0.102	T1organ.
T2basalt	-0.03	0.13	*-0.36*	0.150	-0.02	0.14	0.01	*-0.49*	0.232	-0.02	0.12	0.00	*0.49*	-0.02	0.238	T2basalt
T2chalk	0.28	-0.14	**0.68**	0.593	0.03	0.13	0.00	**0.77**	0.650	-0.04	0.23	0.02	**-0.82**	-0.04	0.772	T2chalk

T2quartz	0.12	−0.04	−0.24	0.065	−0.12	0.18	−0.11	*−0.31*	0.120	0.08	0.16	−0.12	*0.31*	−0.06	0.122	T2quartz
T2mix_m.	−0.05	0.19	−0.28	0.121	0.07	0.20	0.06	*−0.46*	0.224	0.00	0.12	0.04	*0.49*	0.11	0.250	T2mix_m.
T2no_tem	**−0.52**	−0.07	−0.25	0.376	0.00	**−0.84**	0.06	0.04	0.679	0.02	**−0.89**	0.06	0.01	0.02	0.768	T2no_tem
T2organ.	−0.04	0.01	−0.03	0.003	0.05	0.06	−0.03	−0.10	0.013	−0.03	0.05	−0.03	0.10	0.04	0.014	T2organ.
Rim_in	**−0.54**	−0.03	0.02	0.293	*0.36*	−0.28	−0.08	−0.05	0.294	*−0.37*	−0.25	−0.07	0.02	0.11	0.294	Rim_in
Rim_out	0.17	−0.01	*−0.31*	0.115	*−0.30*	−0.07	0.02	−0.21	0.117	−0.10	0.13	0.04	0.06	*−0.47*	0.240	Rim_out
Rim_up	0.28	0.03	0.26	0.164	−0.03	0.28	0.05	0.22	0.168	*0.39*	0.09	0.02	−0.06	*0.33*	0.265	Rim_up

	MR1	MR2	MR3		MR1	MR4	MR2	MR3		MR1	MR4	MR2	MR5	MR3
SS loadings	5.41	2.96	2.73	SS loadings	3.66	3.57	3.10	2.97	SS loadings	3.86	3.22	3.05	2.71	2.14
Proportion Var	0.16	0.09	0.08	Prop. Var	0.11	0.11	0.09	0.09	Proportion Var	0.12	0.10	0.09	0.08	0.06
Cumulative Var	0.16	0.25	**0.34**	Cum. Var	0.11	0.22	0.31	**0.40**	Cumulative Var	0.12	0.21	0.31	0.39	**0.45**
Proportion Explained	0.49	0.27	0.25	Prop. Expl.	0.27	0.27	0.23	0.22	Proportion Expl.	0.26	0.22	0.20	0.18	0.14
The root mean square of the residuals (RMSR) is 0.09				RMSR is 0.08					RMSR is 0.07					

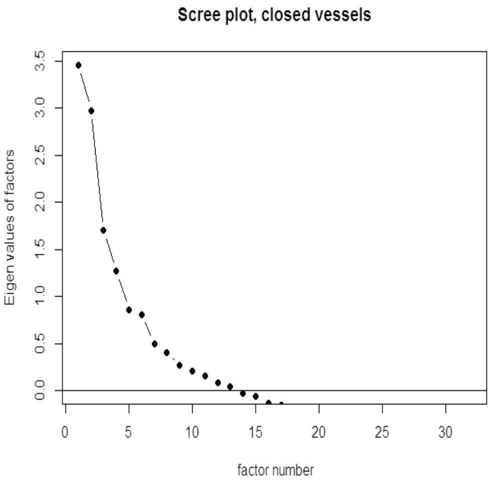
Fig. 5.161 Rotated factor solutions (pattern matrices) for all vessel classes, when continuous and ordinal variables are included in the model fully, and tempering materials and direction of the rim part as dummy-variables. Loadings of 0.5 or more are **bolded**, those of 0.3–0.49 are in *italics* and those below 0.2 are in gray.

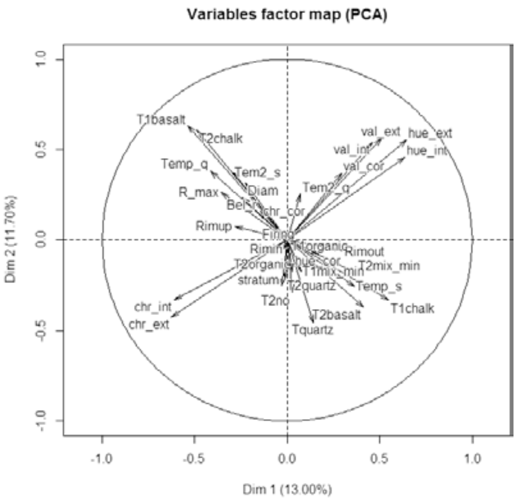
Variable bundles that were strong and stable over different solutions without the categorical variables also stay bundled together in the solutions with the categorical (dummy) variables included. However, now the tempering related variables also receive loadings that may be considered significant. Later, I will only present the solutions with dummies, because they generally provided factor solutions that were more meaningful, and also I considered it worthwhile to use the available information as fully as possible. The more frequently observed tempering materials receive higher loadings, while the rare tempering materials consistently have weak loadings, and their communalities also remain low. Most commonly the solutions that appeared to me to be the best were those with three, four, and five factors extracted. The two factor solution was similar in structure to the two factor solution without dummies. Even though I always began factoring with a two factor solution, they were usually not very insightful. In the two factor solutions, several variables generally had relatively high loadings on the first factor, while surface colors typically loaded on the second. I have included the three most sensible factor models in Figure 5.161: the three, four, and five factor models. It is clear from the loadings across these three solutions that the same variables tend to have high loadings, and some of them constantly group together (e.g. certain color attributes).

The three factor solution seems to be under factored, as the first factor receives several high loadings that seemingly relate to different themes: colors, tempering, and the diameter. At the same time, the second and third factors receive loadings of one or two themes: the second of the surface colors, and the third of the thickness and tempering. In addition, the size-related variables of diameter and thicknesses load on two factors. The results of four and five factor models are more balanced: size attributes form a stable bundle. The main difference between the four and five factor models is that the darkness of the surfaces (values in and out) of the pottery receives weak loading on all factors in the four factor solution, while they form a more reasonable factor together with the colors of the core in the five factor solution. However, the darkness of the surfaces also loads together with the other surface colors in the five factor model – a phenomenon that also appears in many other solutions made with different sub-assemblages. The direction of the rim part has weak loadings on two factors on both the four and five factor models, and appears related foremost to the size related variables. Their loading increases to some extent in the five factor model. All in all, the difference between the four and five factor solutions is small, and both models can be considered meaningful.

The whole assemblage can be divided into functional groups, which I expected might have different factor structures, at least to some extent. In order to investigate the patterning across different functional sub-groups, I made factor analyses separately for closed vessels and open vessels, and then for bowls, cooking pots, jars, jugs, kraters, and pithoi separately.

<u>Closed vessels</u>





Figs. 5.162. a) The scree plot indicates that at least three, and probably four factors are likely to be useful solutions; b) the variables factor map.

Factor pattern matrices for closed vessels analyzed together (three, four and five factor solutions) with dummy-variables of tempering material and direction of the rim part

used varia-bles	3 factor solution				4 factor solution					5 factor solution						used varia-bles
	MR1 surf. col.	MR2 tem-pers	MR3 size core	h2 comm.	MR1 surf. col.	MR2 1te-mper	MR3 size core	MR4 2temper rim dir.	h2 com	MR1 surf. col.	MR2 1te-mper	MR3 size rim d.	MR4 core	MR5 2temp.	h2 comm.	
Diam	0.09	0.24	**0.62**	0.454	0.09	−0.18	**0.57**	0.28	0.461	0.12	−0.10	**0.71**	−0.05	−0.04	0.543	Diam
R_max	−0.04	0.25	**0.76**	0.654	−0.04	−0.18	**0.71**	*0.32*	0.665	0.00	−0.10	**0.84**	−0.11	−0.05	0.760	R_max
Bel_r	0.03	0.15	**0.75**	0.596	0.04	−0.15	**0.73**	0.17	0.596	0.08	−0.09	**0.75**	−0.22	−0.11	0.666	Bel_r
Firing	0.04	−0.06	0.07	0.010	0.04	0.04	0.08	−0.03	0.010	−0.02	−0.02	−0.15	−0.27	0.23	0.115	Firing
Temp_q	−0.05	**0.54**	0.11	0.315	−0.05	*−0.44*	0.04	0.28	0.324	−0.08	*−0.40*	0.19	0.13	0.22	0.326	Temp_q
Temp_s	0.10	*−0.44*	−0.01	0.209	0.05	**0.59**	−0.02	0.23	0.359	0.03	**0.57**	−0.02	−0.01	0.21	0.368	Temp_s
Tem2_q	0.23	0.11	0.15	0.087	0.18	0.14	0.07	**0.51**	0.293	0.06	0.10	0.01	−0.13	**0.73**	0.539	Tem2_q
Tem2_s	0.04	*0.45*	0.14	0.228	0.02	−0.28	0.06	*0.41*	0.289	−0.08	−0.29	0.05	−0.06	**0.59**	0.455	Tem2_s
stratum	−0.20	−0.13	−0.17	0.086	−0.18	0.01	−0.12	−0.28	0.125	−0.16	−0.01	−0.20	−0.02	−0.22	0.126	stratum
hue_cor	0.11	*−0.33*	**0.56**	0.420	0.14	0.19	**0.61**	−0.19	0.464	0.09	0.09	0.11	**−0.74**	0.13	0.591	hue_cor
hue_ext	**0.85**	0.00	0.02	0.726	**0.86**	0.00	0.02	−0.01	0.732	**0.86**	0.01	0.03	0.02	0.02	0.739	hue_ext
hue_int	**0.79**	−0.11	0.15	0.655	**0.80**	0.07	0.16	−0.06	0.670	**0.79**	0.05	0.05	−0.16	0.04	0.670	hue_int
val_cor	*0.43*	0.23	**−0.50**	0.485	*0.40*	−0.06	**−0.55**	0.24	0.544	*0.42*	0.01	−0.15	**0.61**	0.06	0.588	val_cor
val_ext	**0.75**	0.14	−0.12	0.588	**0.73**	−0.05	−0.16	0.15	0.593	**0.74**	−0.02	0.02	0.24	0.09	0.607	val_ext
val_int	**0.70**	0.15	−0.11	0.516	**0.67**	−0.03	−0.16	0.22	0.536	**0.67**	0.00	0.03	0.25	0.15	0.543	val_int
chr_cor	−0.05	*0.39*	**−0.61**	0.501	−0.08	−0.21	**−0.67**	0.25	0.567	−0.03	−0.11	−0.11	**0.81**	−0.09	0.700	chr_cor
chr_ext	**−0.75**	0.08	0.00	0.577	**−0.77**	0.01	−0.03	0.19	0.633	**−0.80**	0.01	0.03	0.05	0.15	0.648	chr_ext
chr_int	**−0.69**	0.18	−0.11	0.518	**−0.71**	−0.08	−0.15	0.19	0.564	**−0.71**	−0.06	0.01	0.20	0.07	0.565	chr_int
T1basalt	0.02	**0.84**	0.04	0.708	0.06	**−0.88**	0.00	0.03	0.780	0.02	**−0.88**	−0.01	0.00	0.20	0.819	T1basalt
T1chalk	0.19	**−0.61**	−0.03	0.423	0.12	**0.79**	−0.04	0.25	0.645	0.10	**0.76**	−0.05	−0.02	0.24	0.657	T1chalk
T1quartz	−0.20	*−0.45*	0.01	0.238	−0.19	*0.35*	0.07	−0.25	0.246	−0.13	*0.35*	0.02	−0.06	*−0.36*	0.295	T1quartz
T1mix_m.	−0.06	−0.17	−0.05	0.036	−0.06	0.12	−0.03	−0.13	0.040	0.00	0.15	0.05	0.11	−0.29	0.109	T1mix_m.
T1organ.	−0.04	−0.07	0.02	0.007	−0.04	0.07	0.03	0.00	0.007	−0.03	0.07	0.04	0.00	−0.05	0.010	T1organ.
T2basalt	0.06	**−0.55**	−0.05	0.311	0.01	**0.65**	−0.04	0.13	0.421	0.01	**0.64**	−0.04	0.00	0.08	0.421	T2basalt
T2chalk	0.04	**0.78**	0.06	0.618	0.06	**−0.73**	0.00	0.21	0.622	0.04	**−0.68**	0.16	0.17	0.18	0.623	T2chalk
T2quartz	−0.15	−0.15	−0.06	0.047	−0.13	0.00	−0.01	*−0.31*	0.109	−0.15	−0.07	−0.28	−0.27	−0.04	0.160	T2quartz
T2mix_m.	0.16	*−0.39*	0.01	0.184	0.13	*0.46*	0.01	0.09	0.230	0.14	*0.47*	0.05	0.03	−0.01	0.238	T2mix_m.
T2no_tem	−0.17	−0.25	0.01	0.087	−0.13	0.02	0.09	*−0.46*	0.237	0.00	0.06	0.14	0.06	**−0.73**	0.529	T2no_tem
T2organ.	−0.09	−0.16	0.00	0.033	−0.10	0.16	0.01	−0.02	0.034	−0.09	0.15	0.00	−0.02	−0.05	0.035	T2organ.

Rim_in	−0.04 −0.02 −0.02 0.002	−0.03 −0.02 0.00 −0.08 0.007	−0.06 −0.05 −0.14 −0.14 0.08 0.039	Rim_in
Rim_out	0.17 −0.19 −0.21 0.116	0.23 −0.10 −0.11 **−0.62** 0.439	0.22 −0.19 *−0.49* *−0.33* −0.23 0.479	Rim_out
Rim_up	−0.15 0.19 0.20 0.107	−0.21 0.11 0.10 **0.63** 0.436	−0.19 0.21 **0.53** *0.38* 0.18 0.509	Rim_up
MR1 MR2 MR3 SS loadings 3.98 3.85 2.71 Proportion Var 0.12 0.12 0.08 Cumulative Var 0.12 0.24 **0.33** Proport. Expl. 0.38 0.37 0.26		MR1 MR2 MR3 MR4 SS loadings 3.96 3.60 2.65 2.47 Prop. Var. 0.12 0.11 0.08 0.08 Cum. Var 0.12 0.24 0.32 **0.40** Prop. Expl. 0.31 0.28 0.21 0.19	MR1 MR2 MR3 MR4 MR5 SS loadings 3.91 3.40 2.64 2.33 2.18 Proportion Var 0.12 0.11 0.08 0.07 0.07 Cumulative Var 0.12 0.23 0.31 0.38 **0.45** Proportion Expl. 0.27 0.24 0.18 0.16 0.15	
The root mean square of the residuals (RMSR) is 0.09		RMSR is 0.08	RMSR is 0.08	

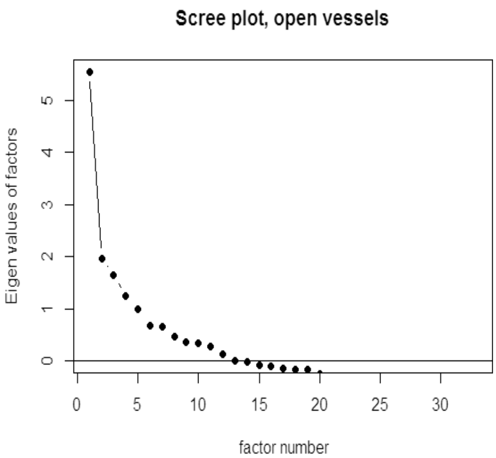
Fig. 5.163 Rotated factor solutions (pattern matrices) for closed vessels together, when continuous and ordinal variables are included in the model fully, and tempering materials and direction of the rim part as dummy-variables. Loadings of 0.5 or more are **bolded**, those of 0.3–0.49 are in *italics,* and those below 0.2 are in gray.

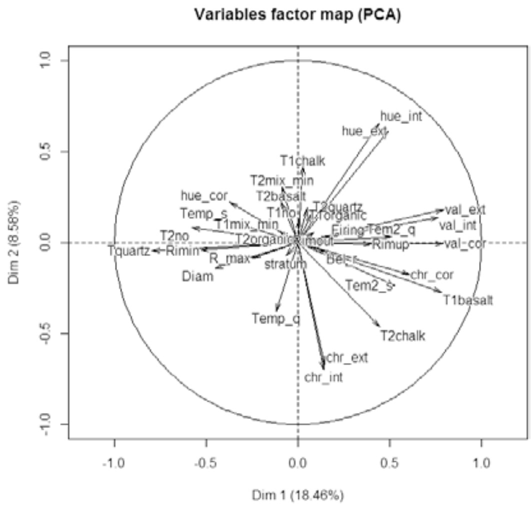
According to the scree plot (Fig. 5.162a), at least three factors should be needed (the drop between the eigenvalues of the two and three factor solutions is the most prominent in the plot), while a five factor solution lies at a point after which the line turns to a more horizontal angle. The variables factor map (Fig. 5.162b) indicates that colors will be prominent in the solutions, in addition to the most commonly observed tempering materials (basalt and quartz as main tempers and chalk as the secondary). The common tempering materials of basalt and chalk form a bundle, always appearing together.

When closed vessels are analyzed separately, the pattern changes only slightly compared to that of all vessels treated together. Most notably, the size-related variables now always load together, already in the three factor model. The size-related variables have very similar loadings in all three solutions. Also, the communalities for the size-related variables and color attributes are relatively high and stable, while the loadings and communalities of tempering materials tend to vary: they are low for the rare materials and high for the frequent ones, high for the quantity and particle size of the secondary temper and relatively low for those of the main temper. Without dummies, the factor solutions of closed vessels were dominated by the size and color attributes, while the variables relating to tempering as well as those of the hardness (firing) and stratum remained with low loadings with all extracted factors. In the solutions with tempering materials included as dummy variables, the qualities of tempering also receive fair loadings, while the hardness and stratum remain with very low loadings.

In three factor solution, the variables relating to the surface colors vary together, while the colors of the core form a bundle with size-related attributes on the third factor, and the features of tempering occupy the second factor. In the four factor solution, tempering attributes divide onto two factors, and the direction of the rim part starts to receive fair loadings. In the five factor solution, the colors of the core dominate the fourth factor, while the size related variables load together with the direction of the rim. In the case of closed vessels, the three factor solution is simplest in terms of interpretation, but several variables receive only weak loadings, reducing the efficiency of the model in grasping the variance in the material (and therefore grasping the facets of the phenomenon). The division of tempering materials onto two factors adds to the complexity of the model, while at the same time the quantity and particle size-attributes of the tempering receive higher loading and communalities, especially in the five factor solution. The loading of the direction of the rim part are highest in the four factor model, and also fairly high in the five factor model, except for the rim parts that are inverted, as such cases are rare in the open closed vessels. In the four factor solution, the rim directions load together with tempering quantity and particle size (of the second tempering material), while in the five factor model they load together with the size related attributes, which seems more reasonable in terms of interpretation, as all of these variables relate to form as well.

Open vessels





Figs. 5.164 a) the scree plot and b) variables factor map for open vessels separately, analysis including tempering materials and direction of the rim part.

Factor pattern matrices for open vessels analyzed together (three, four and five factor solutions) with dummy-variables of tempering material and direction of the rim part																
used varia-bles	3 factor solution				4 factor solution					5 factor solution						used varia-bles
	MR1 size core darkn	MR3 thick ness 2temp	MR2 surf. colors	h2 comm.	MR1 size core darkn	MR3 thick ness 2temp	MR2 surf. color	MR4 1te-mper	h2 comm.	MR1 core dark-ness	MR3 2te-mper	MR2 surf. color	MR4 1te-mper	MR5 size	h2	
Diam	−0.49	0.07	−0.21	0.286	−0.58	0.02	−0.07	0.24	0.372	−0.21	−0.26	−0.09	−0.09	0.64	0.582	Diam
R_max	−0.54	0.43	−0.14	0.356	−0.64	0.38	−0.03	0.18	0.433	−0.15	0.02	−0.06	0.01	0.83	0.736	R_max
Bel_r	−0.18	0.51	−0.06	0.241	−0.30	0.50	0.08	0.20	0.309	0.23	0.08	0.03	0.02	0.83	0.733	Bel_r
Firing	0.05	0.17	0.04	0.038	0.04	0.18	0.03	−0.02	0.038	0.10	0.13	0.02	0.05	0.08	0.042	Firing
Temp_q	0.11	−0.22	−0.38	0.190	−0.13	−0.24	−0.01	0.68	0.494	−0.10	−0.23	0.00	−0.68	0.08	0.498	Temp_q
Temp_s	−0.44	0.02	0.07	0.183	−0.40	−0.01	0.02	−0.10	0.184	−0.35	−0.04	0.03	0.11	0.14	0.184	Temp_s
Tem2_q	−0.03	0.83	0.07	0.674	−0.04	0.85	−0.02	−0.17	0.690	−0.07	0.89	−0.01	0.13	0.01	0.758	Tem2_q
Tem2_s	0.15	0.68	−0.19	0.571	0.04	0.71	−0.10	0.18	0.579	0.02	0.74	−0.10	−0.21	0.03	0.641	Tem2_s
stratum	0.13	−0.26	−0.07	0.069	0.16	−0.26	−0.09	−0.01	0.076	0.11	−0.23	−0.09	0.00	−0.11	0.077	stratum
hue_cor	−0.64	0.29	0.16	0.383	−0.69	0.23	0.21	0.01	0.450	−0.71	0.30	0.24	−0.05	0.10	0.523	hue_cor
hue_ext	0.33	0.07	0.67	0.628	0.21	0.08	0.80	0.05	0.746	0.27	0.05	0.78	−0.03	0.00	0.747	hue_ext
hue_int	0.25	0.10	0.71	0.625	0.14	0.10	0.81	0.00	0.732	0.20	0.07	0.80	0.01	0.00	0.732	hue_int
val_cor	0.78	0.08	0.09	0.679	0.74	0.14	0.13	0.06	0.684	0.83	0.04	0.09	0.00	−0.01	0.743	val_cor
val_ext	0.63	0.25	0.27	0.664	0.54	0.29	0.35	0.07	0.671	0.68	0.17	0.31	0.00	0.09	0.718	val_ext
val_int	0.60	0.26	0.22	0.603	0.51	0.31	0.30	0.08	0.609	0.67	0.17	0.26	−0.01	0.12	0.663	val_int
chr_cor	0.79	−0.16	−0.09	0.562	0.80	−0.10	−0.10	0.03	0.605	0.86	−0.18	−0.14	0.02	−0.08	0.687	chr_cor
chr_ext	0.17	0.20	−0.66	0.492	0.23	0.24	−0.74	0.04	0.617	0.27	0.18	−0.75	0.00	0.08	0.632	chr_ext
chr_int	0.18	0.18	−0.69	0.524	0.23	0.22	−0.74	0.09	0.623	0.24	0.18	−0.75	−0.07	0.04	0.627	chr_int
T1basalt	0.78	0.15	−0.17	0.709	0.64	0.21	0.01	0.35	0.725	0.67	0.18	−0.02	−0.33	−0.05	0.727	T1basalt
T1chalk	−0.23	0.24	0.41	0.232	−0.04	0.24	0.11	−0.59	0.390	−0.02	0.21	0.10	0.60	0.02	0.397	T1chalk
T1quartz	−0.55	−0.41	−0.13	0.653	−0.51	−0.47	−0.13	0.03	0.659	−0.56	−0.42	−0.11	−0.05	0.01	0.661	T1quartz
T1mix_m.	−0.20	0.12	0.04	0.039	−0.25	0.10	0.10	0.08	0.066	−0.32	0.18	0.12	−0.13	−0.05	0.120	T1mix_m.
T1no_tem	−0.09	0.09	0.13	0.025	0.07	0.10	−0.12	−0.41	0.177	−0.02	0.16	−0.11	0.38	−0.15	0.181	T1no_te
T1organ.	−0.12	0.20	0.19	0.071	−0.10	0.19	0.13	−0.14	0.072	0.07	0.05	0.11	0.21	0.25	0.125	T1organ.
T2basalt	−0.19	0.07	0.21	0.069	−0.09	0.06	0.05	−0.31	0.107	−0.05	0.02	0.04	0.32	0.06	0.115	T2basalt
T2chalk	0.39	0.26	−0.42	0.420	0.11	0.27	−0.03	0.71	0.683	0.06	0.35	−0.02	−0.75	−0.04	0.771	T2chalk
T2quartz	−0.11	0.22	0.16	0.070	0.08	0.24	−0.14	−0.51	0.295	0.09	0.21	−0.15	0.52	0.00	0.304	T2quartz

T2mix_m.	−0.24	0.13	0.28	0.126	−0.11	0.12	0.07	*−0.41*	0.195	−0.14	0.14	0.07	*0.40*	−0.04	0.196	T2mix_m.
T2no_tem	−0.08	**−0.81**	0.04	0.703	−0.03	**−0.84**	0.05	0.03	0.705	0.02	**−0.90**	0.05	0.02	0.01	0.795	T2no_tem
T2organ.	−0.09	0.09	0.05	0.012	−0.08	0.08	0.03	−0.05	0.012	−0.02	0.04	0.03	0.07	0.10	0.017	T2organ.
Rim_in	*−0.45*	−0.15	−0.11	0.287	*−0.44*	−0.18	−0.10	0.03	0.293	*−0.34*	−0.26	−0.09	0.01	0.21	0.311	Rim_in
Rim_out	0.06	0.03	0.07	0.011	0.13	0.04	−0.04	−0.18	0.046	0.15	0.01	−0.05	0.20	0.00	0.054	Rim_out
Rim_up	*0.35*	0.10	0.04	0.163	0.28	0.13	0.12	0.13	0.171	0.18	0.22	0.12	−0.18	−0.19	0.209	Rim_up

	MR1	MR3	MR2		MR1	MR3	MR2	MR4		MR1	MR3	MR2	MR4	MR5
SS loadings	5.14	3.31	2.91	SS loadings	4.66	3.55	2.85	2.45	SS loadings	4.67	3.36	2.79	2.40	2.08
Proportion Var	0.16	0.10	0.09	Prop. Var	0.14	0.11	0.09	0.07	Prop. Var	0.14	0.10	0.08	0.07	0.06
Cumulative Var	0.16	0.26	**0.34**	Cum. Var	0.14	0.25	0.34	**0.41**	Cum. Var	0.14	0.24	0.33	0.40	**0.46**
Proportion Expl.	0.45	0.29	0.26	Prop. Expl.	0.34	0.26	0.21	0.18	Prop. Expl.	0.31	0.22	0.18	0.16	0.14
The root mean square of the residuals (RMSR) is 0.09				RMSR is 0.08					RMSR is 0.07					

Fig. 5.165 Rotated factor solutions (pattern matrices) for open vessels together, when continuous and ordinal variables are included in the model fully, and tempering materials and direction of the rim part as dummy-variables. Loadings of 0.5 or more are **bolded**, those of 0.3–0.49 are in *italics,* and those below 0.2 are in gray.

In the three factor model, the first factor again receives fairly high loading of conceptually different domains: colors on one hand, size-related diameter and maximum thickness of the rim and rim direction on the other, and even some variables relating to the tempering appear on the same factor. Also, the loading of the size related variables of diameter and thicknesses of the rim part on two factors is hard to explain. In the four and five factor solutions the tempering attributes receive more high loadings than in the three factor solution, and they dominate the second and fourth factors, while some materials still load on the first factor. Their patterning on mainly two factors is best reached in the five factor solution, which is also the model where the size related variables bundle together. Therefore, in the case of open vessels analyzed separately, the five factor solution seems to produce the simplest interpretation in terms of the interpretation of the factors. It is naturally also the solution with the highest variance accounted for (cumulative variance is 46 %), however the difference with that of the four factor solution (41 %) is not great.

As was the case with the closed vessels, the variables related to the hardness (firing) or to the stratum did not form any significant correlations with any of the factors. When comparing the factor solutions of the open vessels to those of the closed ones, the pattern of size-related variables in the open vessels is not as stable as it was with the closed vessels: the size related variables of diameter and thicknesses of the rim part load on two factors. Compared to the closed vessels, the tempering-related variables of the secondary temper have higher and more stable loadings than they had for closed vessels. The variables related to the main tempering are less consistently bundled together than they were in the subset of closed vessels. In addition to the fairly strong loadings of basalt and chalk, the loadings of quartz, both as the main and as the secondary tempering material, now appear strong, and the absence of the secondary temper receives strong loadings in all factor models for the open vessels. These differences are probably at due to the fact that cooking pots differ from other vessel classes in their color and tempering attributes, and that they are included in the open vessels.

The attributes of the hue and brightness (chroma) of the surface colors and all color variables of the core form two relatively stable bundles in closed and open vessel groups, but the darkness differs in these subgroups. In the closed vessels the darkness of the surface varied together with other surface color-variables and the darkness of the core with other color variables in the core, while also having weak loadings with the core colors. In the open vessels, the darkness of surfaces as well as that of the core all associate with the other color attributes of the core. However, the differences as to the color variables are small, while those of the size-related variables, as well as the variables related to tempering, differ more clearly in these two functional groups. In order to understand the difference between the closed and open vessels, we need to look at the patterns of the vessel classes.

<u>Bowls</u>

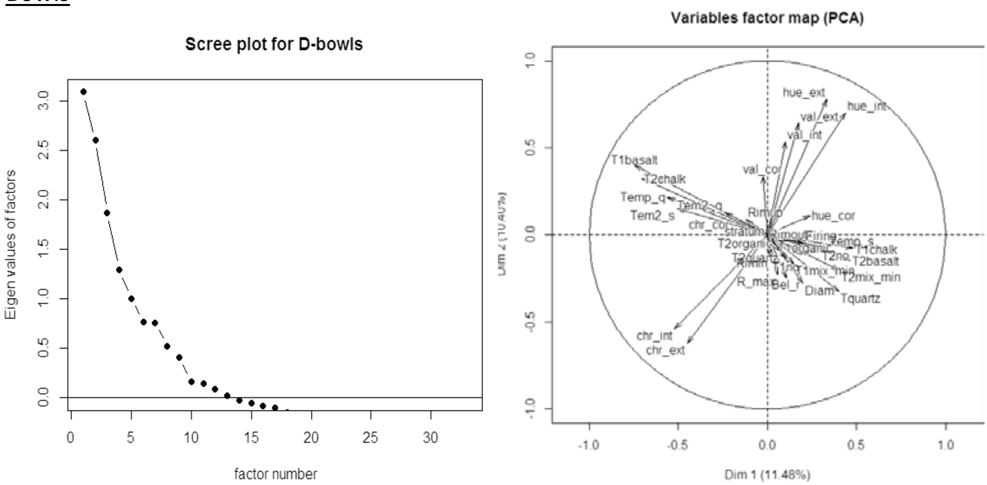


Fig. 5.166 a) Scree plot for factor solutions and b) Variables factor map for bowls separately.

Factor pattern matrices for bowls analyzed together (three, four and five factor solutions) with dummy-variables of tempering material and direction of the rim part

used varia-bles	3 factor solution				4 factor solution					5 factor solution						used varia-bles
	MR1 tem-pers	MR2 surf. color	MR3 size core	h2 comm.	MR1 tem-pers	MR2 surf. color	MR3 size core	MR4 rim dir.	h2 comm.	MR1 tem-pers	MR2 surf. color	MR3 core	MR5 size	MR4 rim dir.	h2 comm.	
Diam	−0.16	−0.11	**0.54**	0.337	−0.17	−0.09	*0.46*	*0.45*	0.470	0.19	−0.08	−0.19	**0.54**	0.26	0.470	Diam
R_max	0.04	−0.11	**0.70**	0.495	0.03	−0.10	**0.65**	*0.31*	0.532	0.07	−0.09	−0.25	**0.70**	−0.06	0.596	R_max
Bel_r	−0.02	−0.11	**0.70**	0.498	−0.03	−0.10	**0.64**	*0.35*	0.553	0.12	−0.09	−0.23	**0.71**	−0.01	0.613	Bel_r
Firing	−0.15	0.06	0.18	0.064	−0.15	0.06	0.18	0.04	0.064	0.18	0.07	−0.09	0.14	−0.03	0.069	Firing
Temp_q	**0.64**	−0.03	0.12	0.414	**0.64**	−0.04	0.13	−0.04	0.417	**−0.66**	−0.03	−0.18	0.02	0.01	0.449	Temp_q
Temp_s	*−0.30*	0.09	0.15	0.131	*−0.30*	0.11	0.10	0.29	0.200	*0.33*	0.11	0.07	0.26	0.14	0.209	Temp_s
Tem2_q	*0.34*	0.04	0.20	0.145	*0.33*	0.06	0.13	*0.35*	0.252	−0.24	0.05	0.20	*0.48*	−0.02	0.333	Tem2_q
Tem2_s	**0.57**	−0.07	0.13	0.335	**0.56**	−0.04	0.05	*0.44*	0.515	**−0.52**	−0.05	0.18	*0.39*	0.19	0.518	Tem2_s
stratum	−0.06	−0.03	−0.19	0.038	−0.06	−0.02	−0.21	0.09	0.054	−0.01	−0.03	0.07	−0.18	0.26	0.107	stratum
hue_cor	0.05	0.28	**0.69**	0.551	0.03	0.25	**0.73**	−0.16	0.627	−0.05	0.29	**−0.71**	0.21	−0.09	0.659	hue_cor
hue_ext	0.09	**0.85**	0.01	0.732	0.09	**0.85**	0.03	−0.02	0.732	−0.09	**0.85**	−0.04	−0.04	0.00	0.736	hue_ext
hue_int	−0.02	**0.83**	0.07	0.707	−0.03	**0.83**	0.10	−0.03	0.708	0.02	**0.84**	−0.10	−0.02	−0.01	0.712	hue_int
val_cor	0.04	0.24	**−0.51**	0.321	0.05	0.27	**−0.55**	0.22	0.417	0.04	0.23	**0.72**	0.02	−0.05	0.559	val_cor
val_ext	0.12	**0.65**	−0.12	0.441	0.12	**0.66**	−0.14	0.18	0.483	−0.04	**0.64**	*0.34*	0.17	−0.08	0.558	val_ext
val_int	0.14	**0.52**	−0.11	0.296	0.14	**0.53**	−0.13	0.17	0.335	−0.04	**0.51**	*0.38*	0.22	−0.15	0.466	val_int
chr_cor	−0.02	−0.14	**−0.71**	0.533	−0.01	−0.12	**−0.77**	0.20	0.640	0.06	−0.16	**0.81**	−0.15	0.05	0.718	chr_cor
chr_ext	0.10	**−0.76**	0.01	0.594	0.10	**−0.76**	−0.01	0.05	0.597	−0.06	**−0.76**	0.11	0.15	−0.09	0.629	chr_ext
chr_int	0.19	**−0.72**	−0.03	0.568	0.19	**−0.72**	−0.05	0.00	0.568	−0.15	**−0.73**	0.12	0.10	−0.13	0.600	chr_int
T1basalt	**0.83**	0.03	−0.12	0.722	**0.84**	0.03	−0.11	−0.04	0.722	**−0.87**	0.02	0.00	−0.12	0.03	0.761	T1basalt
T1chalk	**−0.51**	0.12	−0.12	0.284	**−0.51**	0.14	−0.15	0.16	0.317	**0.53**	0.13	0.22	0.04	0.09	0.335	T1chalk
T1quartz	*−0.49*	−0.11	0.11	0.270	*−0.49*	−0.11	0.10	0.06	0.271	*0.43*	−0.10	−0.19	−0.06	0.23	0.314	T1quartz
T1mix_m.	−0.19	−0.08	0.08	0.051	−0.19	−0.10	0.13	−0.26	0.131	0.22	−0.09	−0.15	−0.05	−0.25	0.143	T1mix_m.
T1no_tem	−0.20	−0.10	−0.13	0.061	−0.20	−0.09	−0.13	−0.01	0.061	0.22	−0.10	0.17	−0.02	−0.07	0.083	T1no_te
T1organ.	−0.16	0.01	0.27	0.107	−0.17	0.01	0.28	−0.01	0.110	0.27	0.01	−0.04	*0.32*	−0.27	0.231	T1organ.
T2basalt	*−0.47*	0.08	0.08	0.239	*−0.47*	0.09	0.04	0.20	0.274	*0.46*	0.09	0.02	0.11	0.18	0.274	T2basalt
T2chalk	**0.81**	0.00	0.03	0.650	**0.81**	−0.01	0.03	−0.01	0.650	**−0.80**	−0.01	−0.02	0.06	−0.06	0.652	T2chalk
T2quartz	−0.13	−0.06	−0.04	0.021	−0.13	−0.06	−0.05	0.03	0.022	0.11	−0.06	0.03	−0.03	0.06	0.023	T2quartz
T2mix_m.	*−0.46*	−0.01	0.00	0.211	*−0.46*	−0.01	−0.01	0.06	0.215	**0.52**	−0.01	0.17	0.14	−0.11	0.296	T2mix_m.
T2no_tem	*−0.35*	0.04	−0.15	0.144	*−0.35*	0.01	−0.06	**−0.50**	0.373	0.25	0.02	*−0.30*	**−0.54**	−0.09	0.456	T2no_tem
T2organ.	−0.04	−0.02	0.06	0.007	−0.05	−0.02	0.05	0.08	0.011	0.02	−0.02	−0.06	0.03	0.11	0.019	T2organ.
																Rim_in

Rim_in	−0.09	−0.11	−0.05	0.020	−0.09	−0.09	−0.10	0.27	0.100	0.06	−0.09	0.11	0.06	0.28	0.110	Rim_out
Rim_out	−0.13	0.02	0.00	0.016	−0.13	0.06	−0.11	**0.56**	0.342	−0.02	0.06	−0.02	0.00	**0.81**	0.659	Rim_up
Rim_up	0.16	0.03	0.02	0.027	0.16	−0.02	0.15	**−0.67**	0.490	−0.01	−0.01	−0.04	−0.03	**−0.91**	0.832	

	MR1	MR2	MR3
SS loadings	3.66	3.50	2.87
Proportion Var	0.11	0.11	0.09
Cumulative Var	0.11	0.22	**0.30**
Proportion Explained	0.36	0.35	0.29
The root mean square of the residuals (RMSR) is 0.1			

	MR1	MR2	MR3	MR4
SS loadings	3.66	3.50	2.85	2.25
Prop. Var	0.11	0.11	0.09	0.07
Cumu. Var	0.11	0.22	0.30	**0.37**
Prop. Expl.	0.30	0.29	0.23	0.18
RMSR is 0.09				

	MR1	MR2	MR3	MR5	MR4
SS loadings	3.61	3.49	2.51	2.46	2.11
Proportion Var	0.11	0.11	0.08	0.07	0.06
Cumulative Var	0.11	0.22	0.29	0.37	**0.43**
Proportion Explained	0.25	0.25	0.18	0.17	0.15
RMSR is 0.08					

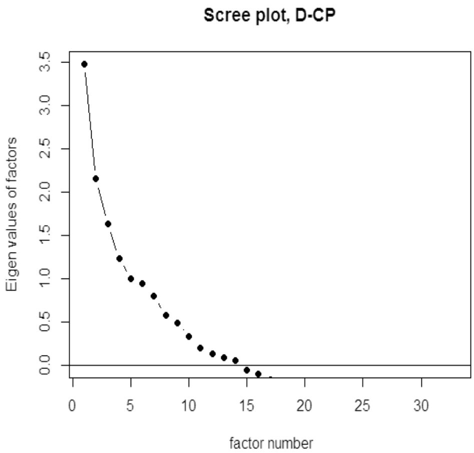
Fig. 5.167 Rotated factor solutions (pattern matrices) for bowls, variables and text formatting as above.

Without dummies, all factor solutions of bowls were dominated by the color variables, and the size-related variables also bundled together. The variables related to the tempering only bundled together in the four and five factor solutions, and not very strongly even then. Hardness (firing) or stratum do not load upon any of the extracted factors. With 4 or more factors, the color variables started to separate to several factors, reducing the interpretative value of the solution. The solutions of three and four factors produced the most sensible results, and the three factor solution was simpler, while in the four factor solution the temper-attributes started to emerge.

The factor structure of bowls is remarkably more similar to the pattern of closed vessels (Fig. 5.163) than that of the open vessels (Fig. 5.165). This is especially clear in the three factor solution, where only the numbering of the first and second factors is conversed (the loadings of course are slightly different as well, as the observations are not the same). However, as the two first factors have almost the same proportion of variance accounted for, the difference of order is meaningless. Unlike in the four and five factor models of the closed vessels, the variables related to tempering consistently form the first factor, and only the absence of the secondary tempering in four and five factor solutions receives loadings (also) with size and rim direction. Surface color attributes always occupy the second factor.

For bowls as well as for the closed vessels, the size related variables bundle together with the colors of the core in the three and four factor solutions, while in the five factor model they separate on their own factors. While the direction of the rim part loaded together with size (a reasonable connection may be present at least between opening rims and diameter) or tempering attributes (less reasonable connection) in the closed vessels, the rim direction for the bowls dominates the fourth factor in the four and five factor solutions (with weak loadings of size attributes in the four factor solution, and being the only theme on it in the five factor solution). The four factor model has the drawback that both size related attributes and some of the tempering related variables load on two factors: size on the third and fourth, and some tempering details on the first and fourth factors. This blurs the interpretation of the fourth factor. The same phenomenon appears in the five factor solution for the same details of tempering, while the size related variables then bundle together on the fifth factor. The three, four, and five factor solutions can all be considered reasonable. The three factor solution has a very low proportion of variance accounted for (30 %), and the remaining, unexplained variance remains high. The four factor solution has two themes that split on two factors, reducing the interpretative value of the solution, and the variance that is accounted for still remains pretty low (37 %). The five factor model is sensible in terms of factors interpretation, and it also provides the highest amount of variance explained (43 %). Guided by the scree plot, I also examined the solution with six factors extracted. However, it did not provide a solution that would have been more sensible than that of five factors: the tempering related variables started to split on two factors (1 and 6) that correlated slightly with each other (at -0.19). The proportion of variance accounted for was not much higher (48 %), nor was the root mean square of the residuals much lower (0.07) compared to those of the five factor solution (43 % and 0.07).

Cooking pots



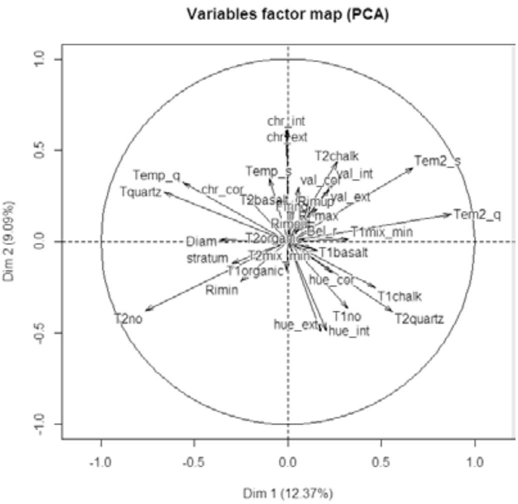


Fig. 5.168 a) Scree plot for factor solutions and b) a variables factor map for cooking pots (with dummies).

Factor pattern matrices for cooking pots analyzed together (three, four and five factor solutions) with dummy-variables of tempering material and direction of the rim part

used varia-bles	CP 3 factor solution				CP 4 factor solution					CP 5 factor solution						used varia-bles
	MR1 2(+1) temp.	MR2 1(+2) temp.	MR3 hue brightness	h2 comm.	MR1 2(+1) temp.	MR2 1(+2) temp.	MR3 surf. color	MR4 core	h2 comm.	MR2 2.temper	MR1 1(+2) temp.	MR3 surf. col.	MR5 surf. darkn	MR4 core	h2 comm.	
Diam	*-0.30*	-0.17	0.06	0.147	*-0.33*	0.15	0.24	-0.21	0.230	-0.23	-0.18	0.22	-0.25	-0.15	0.234	Diam
R_max	0.08	0.02	0.09	0.015	0.05	-0.04	0.28	-0.22	0.124	0.17	0.05	0.26	-0.27	-0.14	0.169	R_max
Bel_r	0.14	-0.01	0.05	0.022	0.13	0.00	0.13	-0.10	0.044	0.14	0.01	0.13	-0.03	-0.09	0.045	Bel_r
Firing	0.23	-0.08	0.05	0.056	0.22	0.07	0.12	-0.08	0.070	0.20	-0.06	0.12	0.05	-0.09	0.070	Firing
Temp_q	-0.05	**-0.81**	-0.02	0.678	-0.05	**0.82**	-0.05	0.04	0.686	-0.10	**-0.83**	-0.03	0.14	-0.01	0.711	Temp_q
Temp_s	0.19	*-0.36*	0.16	0.175	0.20	*0.36*	0.07	0.16	0.186	0.01	*-0.37*	0.11	*0.44*	0.03	0.322	Temp_s
Tem2_q	**0.70**	*0.37*	0.00	0.716	**0.70**	*-0.37*	0.00	-0.03	0.717	**0.62**	*0.41*	0.01	0.19	-0.06	0.718	Tem2_q
Tem2_s	**0.78**	0.01	0.07	0.622	**0.78**	-0.02	0.12	-0.06	0.633	**0.79**	0.08	0.11	0.05	-0.04	0.672	Tem2_s
stratum	*-0.32*	-0.05	0.01	0.111	*-0.32*	0.05	0.03	-0.02	0.113	-0.10	-0.06	-0.01	*-0.46*	0.12	0.265	stratum
hue_cor	0.25	-0.07	**-0.54**	0.345	0.18	0.04	-0.08	**-0.75**	0.632	0.10	-0.04	-0.06	0.08	**-0.82**	0.705	hue_cor
hue_ext	0.04	0.01	**-0.54**	0.295	0.05	0.01	**-0.66**	0.01	0.437	-0.02	-0.01	**-0.65**	0.16	-0.03	0.445	hue_ext
hue_int	0.07	0.01	**-0.64**	0.410	0.09	0.02	**-0.80**	0.05	0.643	0.05	-0.01	**-0.80**	0.10	0.03	0.643	hue_int
val_cor	0.16	-0.05	*0.39*	0.180	0.23	0.08	-0.06	**0.70**	0.513	0.15	-0.06	-0.05	0.26	**0.66**	0.515	val_cor
val_ext	0.29	-0.03	0.16	0.110	*0.31*	0.04	0.01	0.24	0.144	0.10	-0.03	0.05	*0.47*	0.10	0.258	val_ext
val_int	*0.39*	-0.09	0.17	0.182	*0.42*	0.10	0.01	0.25	0.220	0.13	-0.09	0.07	**0.62**	0.07	0.433	val_int
chr_cor	-0.18	0.01	**0.57**	0.360	-0.10	0.03	0.08	**0.82**	0.708	-0.05	-0.01	0.06	-0.01	**0.86**	0.767	chr_cor
chr_ext	0.16	0.00	**0.66**	0.465	0.16	-0.02	**0.69**	0.14	0.537	0.09	0.02	**0.70**	0.14	0.10	0.552	chr_ext
chr_int	0.17	-0.02	**0.70**	0.524	0.17	0.00	**0.77**	0.10	0.642	0.09	0.01	**0.78**	0.16	0.05	0.667	chr_int
T1basalt	0.03	0.21	0.05	0.048	0.04	-0.20	-0.01	0.09	0.053	0.08	0.21	-0.02	-0.07	0.13	0.068	T1basalt
T1chalk	0.06	**0.62**	0.02	0.400	0.07	**-0.62**	0.00	0.04	0.400	-0.14	**0.61**	0.03	*0.36*	-0.08	0.533	T1chalk
T1quartz	*-0.32*	**-0.57**	0.18	0.544	*-0.34*	**0.56**	0.28	-0.07	0.577	-0.17	**-0.57**	0.25	*-0.33*	0.02	0.615	T1quartz
T1mix_m.	*0.40*	-0.04	-0.23	0.208	*0.41*	0.05	*-0.32*	0.05	0.254	0.27	-0.03	-0.29	*0.33*	-0.04	0.282	T1mix_m.
T1no_tem	-0.11	**0.63**	-0.05	0.394	-0.11	**-0.63**	-0.02	-0.05	0.397	0.09	**0.64**	-0.07	*-0.44*	0.09	0.584	T1no_te
T1organ.	-0.06	0.05	-0.13	0.023	-0.06	-0.05	-0.14	-0.02	0.026	-0.10	0.04	-0.13	0.05	-0.05	0.032	T1organ.
T2basalt	0.05	0.00	0.23	0.056	0.06	0.01	0.13	0.19	0.062	0.02	0.00	0.14	0.12	0.17	0.065	T2basalt
T2chalk	**0.63**	*-0.39*	-0.04	0.457	**0.60**	*0.37*	0.09	-0.21	0.493	**0.69**	*-0.33*	0.08	-0.11	-0.15	0.560	T2chalk
T2quartz	-0.03	**0.88**	0.04	0.770	-0.02	**-0.89**	0.06	-0.03	0.779	-0.07	**0.89**	0.06	0.01	-0.04	0.781	T2quartz
																T2mix_m.

T2mix_m.	0.10	−0.02	−0.12	0.025	0.11	0.03	−0.18	0.04	0.043	0.01	−0.03	−0.16	0.21	−0.02	0.070	T2no_tem
T2no_tem	**−0.84**	−0.04	−0.01	0.725	**−0.84**	0.05	−0.04	0.06	0.728	**−0.81**	−0.11	−0.04	−0.12	0.06	0.751	T2organ.
T2organ.	0.11	0.00	−0.02	0.012	0.12	0.01	−0.12	0.11	0.035	0.15	0.01	−0.12	−0.02	0.13	0.050	Rim_in
Rim_in	*−0.44*	0.11	0.01	0.188	*−0.46*	−0.12	0.15	−0.17	0.237	**−0.56**	0.08	0.17	0.11	−0.24	0.366	Rim_out
Rim_out	0.15	0.07	0.07	0.036	0.18	−0.06	−0.10	0.24	0.094	0.05	0.07	−0.08	0.28	0.17	0.119	Rim_up
Rim_up	*0.35*	−0.18	−0.06	0.134	*0.35*	0.18	−0.07	−0.02	0.135	**0.56**	−0.14	−0.12	*−0.35*	0.12	0.411	

	MR1	MR2	MR3
SS loadings	3.60	3.14	2.70
Prop. Var	0.11	0.10	0.08
Cum. Var	0.11	0.20	**0.29**
Prop. Expl.	0.38	0.33	0.29

The root mean square of the residuals (RMSR) is 0.1

	MR1	MR2	MR3	MR4
SS loadings	3.60	3.13	2.66	2.20
Prop. Var	0.11	0.09	0.08	0.07
Cum. Var	0.11	0.20	0.28	**0.35**
Prop. Expl.	0.31	0.27	0.23	0.19

RMSR is 0.09

	MR2	MR1	MR3	MR5	MR4
SS loadings	3.24	3.19	2.65	2.23	2.17
Proportion Var	0.10	0.10	0.08	0.07	0.07
Cumulative Var	0.10	0.19	0.28	0.34	**0.41**
Proportion Explained	0.24	0.24	0.20	0.17	0.16

RMSR is 0.09

Fig. 5.169a Rotated factor solutions for cooking pots with dummies. Text formatting as above.

	CP 2 factor solution			CP 3 factor solution				CP 4 factor solution					CP 5 factor solution						
	MR1	MR2	h2	MR2	MR1	MR3	h2	MR3	MR2	MR1	MR4	h2	MR3	MR2	MR1	MR4	MR5	h2	
	surf.	core		surf.	core	temper		surf.	core	temper	darkn.		surf.	core	2-temp	darkn	1-temp		
Diam	0.00	−0.15	0.022	0.09	0.01	−0.28	0.085	0.10	0.02	−0.18	−0.19	0.091	0.09	0.01	−0.11	−0.24	0.19	0.122	Diam
R_max	0.13	0.06	0.020	0.13	−0.04	0.05	0.020	0.13	−0.02	0.08	−0.10	0.029	0.13	−0.03	0.10	−0.12	0.07	0.034	R_max
Bel_r	0.08	0.07	0.009	0.05	−0.01	0.09	0.011	0.06	0.00	0.10	−0.05	0.012	0.05	−0.02	0.15	−0.09	0.13	0.031	Bel_r
Firing	0.13	0.13	0.029	0.08	−0.06	0.15	0.035	0.07	−0.08	0.05	0.18	0.051	0.08	−0.08	0.02	0.20	−0.07	0.056	Firing
Temp_q	−0.08	−0.23	0.052	0.02	0.05	*−0.33*	0.116	−0.01	0.04	*−0.39*	0.12	0.155	−0.05	−0.01	−0.16	−0.03	**0.65**	0.495	Temp_q
Temp_s	0.13	−0.06	0.024	0.13	0.06	0.00	0.023	0.12	0.07	−0.02	0.10	0.032	0.09	0.02	0.16	−0.03	**0.50**	0.244	Temp_s
Tem2_q	0.20	*0.45*	0.221	−0.03	−0.04	**0.83**	0.692	−0.02	−0.01	**1.00**	−0.01	0.995	−0.03	−0.02	**0.98**	−0.01	−0.05	0.995	Tem2_q
Tem2_s	0.26	*0.35*	0.163	0.05	0.03	**0.74**	0.542	0.06	0.03	**0.71**	0.00	0.511	0.05	0.02	**0.74**	−0.02	0.06	0.520	Tem2_s
stratum	−0.09	−0.19	0.040	0.00	0.05	−0.28	0.086	0.02	0.08	−0.14	−0.29	0.127	0.02	0.08	−0.14	−0.29	0.00	0.126	stratu
hue_cor	−0.02	**0.79**	0.630	0.01	**−0.86**	0.04	0.753	0.00	**−0.83**	0.02	0.07	0.704	−0.01	**−0.85**	0.05	0.05	0.07	0.727	hue_co
hue_ex	**−0.64**	0.06	0.430	**−0.68**	−0.01	0.08	0.465	**−0.68**	−0.02	0.01	0.16	0.486	**−0.68**	−0.03	0.03	0.15	0.05	0.487	hue_ex
hue_in	**−0.69**	0.05	0.482	**−0.76**	0.03	0.13	0.580	**−0.78**	0.02	0.08	0.11	0.628	**−0.79**	0.02	0.10	0.10	0.04	0.636	hue_in
val_cor	0.06	*−0.35*	0.134	−0.03	*0.49*	0.22	0.263	−0.06	*0.46*	0.07	0.34	0.347	−0.06	*0.46*	0.09	*0.33*	0.07	0.350	val_co
val_ex	0.15	0.09	0.027	0.05	0.05	0.27	0.074	−0.01	0.00	−0.03	**0.73**	0.522	0.00	0.00	−0.05	**0.75**	−0.04	0.537	val_ex
val_in	0.18	0.13	0.043	0.08	0.01	0.28	0.086	0.04	−0.05	0.00	**0.72**	0.515	0.04	−0.04	0.00	**0.71**	0.02	0.510	val_in
chr_cor	0.05	**−0.80**	0.647	0.01	**0.92**	0.00	0.852	0.01	**0.95**	0.00	0.00	0.901	0.01	**0.94**	0.01	0.00	0.04	0.885	chr_co
chr_ex	**0.71**	0.00	0.510	**0.68**	0.05	0.12	0.485	**0.65**	0.05	0.06	0.17	0.473	**0.64**	0.04	0.07	0.16	0.06	0.470	chr_ex
chr_in	**0.77**	0.04	0.580	**0.76**	0.00	0.11	0.585	**0.76**	0.00	0.07	0.16	0.619	**0.75**	−0.01	0.08	0.15	0.05	0.619	chr_in

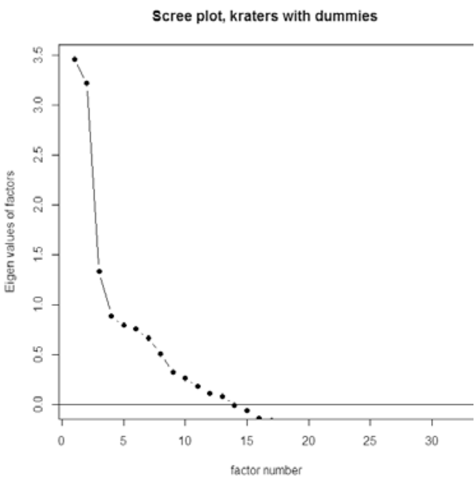
Fig. 5.169b Rotated factor loadings for cooking pots (without categorical variables). Formatting as above.

While hue and brightness of the colors occupied a dominant position in solutions without dummies (Fig. 5.169b), the value (darkness) of the colors was absent in the two and three factor solutions and only appeared in the four and five factor solutions. The tempering-related variables also bundled in all solutions. The variables related to size did not load on any of the factors in any of the solutions. The same phenomena regarding the darkness, the strong appearance of tempering attributes and low loadings of size-related variables, are apparent in the solutions when categorical variables are included (Fig. 5.169a). Thus, the cooking pots seem to have a factor pattern that sets them apart from all the other vessel groups.

When the categorical variables of tempering material and rim direction are included (Fig. 5.169a), the solution with two factors extracting the tempering materials already occupied them both, while the color related variables loaded weakly on both in different patterns than in other vessel groups in three and four factor solutions. The pattern of surface colors versus core colors, which was fairly consistent in other subgroups, emerges in the cooking pots in the four factor solution. However, the darkness-variables of the surfaces never significantly load with other color variables. The first solution where darkness of the surfaces receives fair loadings is the five factor model, where they occupy the fifth factor, which receives somewhat significant loadings of stratum – a chronologically determined variable that usually does not receive any significant loadings and conceptually should not have a connection to the darkness of the cooking pots. The direction of the rim part loads on the first factor, together with the (foremost secondary) tempering material and its qualities, and this is the only factor that receives any significant loadings of the diameter of the cooking pots.

The low loadings of size attributes and darkness across all solutions are due to the low variability of the size and rim thicknesses in the cooking pots, as well as to the invariably dark color of the cooking pots. The factor models of cooking pots have less success in accounting for the variance in the material: even the most complex of the presented models with five factors reaches only 41 % of variance accounted for. The simplest and sensible factor solution as to the interpretation of factors is the model with four factors, which accounts only for 35 % of the variance.

Kraters



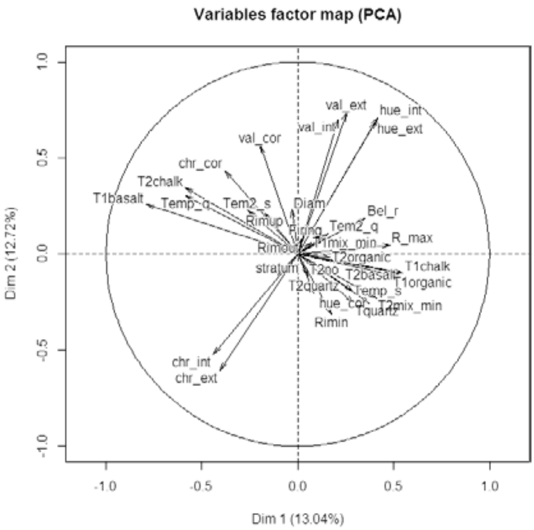


Fig. 5.170 a) Scree plot for factor solutions and b) Variables factor map for kraters separately.

Factor pattern matrices for kraters analyzed together (three, four and five factor solutions) with dummy-variables of tempering material and direction of the rim part																
used varia- bles	3 factor solution				4 factor solution					5 factor solution						used varia- bles
	MR2 surf. col.	MR1 tem- pers	MR3 size core	h2 comm.	MR2 surf. col.	MR1 tem- pers	MR3 size core	MR4 rim dir.	h2 comm.	MR2 surf. col.	MR1 tem- pers	MR3 core col.	MR5 size	MR4 rim dir.	h2 comm.	
Diam	0.17	*0.32*	*0.30*	0.175	0.17	*0.35*	*0.30*	0.04	0.197	−0.01	0.18	−0.19	**0.61**	−0.09	0.413	Diam
R_max	0.19	−0.03	**0.71**	0.558	0.19	0.02	**0.72**	0.09	0.575	0.06	−0.12	0.21	**0.77**	−0.02	0.720	R_max
Bel_r	0.27	0.11	**0.62**	0.447	0.27	0.15	**0.62**	0.06	0.466	0.10	−0.02	0.06	**0.79**	−0.07	0.679	Bel_r
Firing	0.15	−0.14	−0.07	0.041	0.16	−0.11	−0.06	0.07	0.042	0.22	−0.05	0.09	−0.18	0.12	0.089	Firing
Temp_q	0.01	**0.69**	−0.01	0.485	0.00	**0.59**	−0.04	*−0.30*	0.498	0.00	**0.64**	−0.02	−0.04	−0.23	0.504	Temp_q
Temp_s	−0.05	*−0.32*	0.06	0.120	−0.05	*−0.31*	0.08	0.06	0.121	0.01	−0.27	0.18	−0.08	0.08	0.134	Temp_s
Tem2_q	0.12	0.13	*0.38*	0.156	0.12	0.09	*0.37*	−0.10	0.159	0.20	0.19	*0.44*	0.05	0.00	0.231	Tem2_q
Tem2_s	0.07	*0.48*	0.21	0.224	0.06	**0.50**	0.20	0.01	0.250	0.12	**0.56**	0.23	0.01	0.13	0.324	Tem2_s
stratum	−0.13	−0.01	−0.09	0.027	−0.14	−0.07	−0.10	−0.14	0.051	−0.16	−0.07	−0.09	−0.04	−0.17	0.061	stratum
hue_cor	−0.14	−0.06	**0.69**	0.516	−0.14	−0.09	**0.69**	−0.09	0.522	−0.03	0.02	**0.75**	0.17	0.03	0.610	hue_cor
hue_ext	**0.80**	−0.09	−0.01	0.650	**0.80**	−0.09	−0.01	−0.02	0.650	**0.82**	−0.04	0.00	−0.03	0.01	0.673	hue_ext
hue_int	**0.82**	−0.04	0.07	0.678	**0.82**	−0.05	0.07	−0.03	0.678	**0.81**	−0.02	0.01	0.07	−0.01	0.686	hue_int
val_cor	*0.46*	0.21	*−0.39*	0.439	*0.46*	0.22	*−0.40*	0.02	0.443	*0.37*	0.15	**−0.50**	−0.03	−0.04	0.473	val_cor
val_ext	**0.77**	0.10	0.02	0.604	**0.77**	0.11	0.02	−0.01	0.606	**0.77**	0.14	−0.02	0.04	0.03	0.622	val_ext
val_int	**0.72**	0.13	0.03	0.535	**0.72**	0.18	0.04	0.09	0.559	**0.66**	0.14	−0.15	0.20	0.07	0.561	val_int
chr_cor	0.29	0.19	**−0.62**	0.544	0.28	0.20	**−0.62**	0.03	0.547	0.15	0.09	**−0.74**	−0.08	−0.08	0.646	chr_cor
chr_ext	**−0.72**	0.13	0.02	0.540	**−0.72**	0.17	0.02	0.09	0.552	**−0.74**	0.12	0.00	0.04	0.06	0.565	chr_ext
chr_int	**−0.67**	0.20	0.02	0.480	**−0.66**	0.23	0.01	0.06	0.491	**−0.66**	0.21	0.04	−0.02	0.07	0.491	chr_int
T1basalt	−0.11	**0.84**	−0.07	0.745	−0.13	**0.73**	−0.11	*−0.31*	0.754	−0.11	**0.79**	−0.03	−0.13	−0.21	0.773	T1basalt
T1chalk	0.15	**−0.52**	0.09	0.322	0.14	**−0.60**	0.10	−0.18	0.426	0.24	*−0.49*	*0.31*	−0.19	−0.14	0.465	T1chalk
T1quartz	−0.08	**−0.50**	−0.18	0.245	−0.06	*−0.38*	−0.15	*0.34*	0.286	−0.18	**−0.54**	*−0.37*	0.19	0.17	0.444	T1quartz
T1mix_m.	0.09	−0.09	−0.08	0.018	0.10	−0.02	−0.06	0.17	0.041	0.06	−0.07	−0.15	0.07	0.13	0.050	T1mix_m.

T1organ.	0.09	*−0.35*	0.28	0.259	0.11	−0.24	*0.31*	0.28	0.306	0.12	−0.26	0.22	0.19	0.28	0.307	T1organ.
T2basalt	0.14	**−0.55**	0.00	0.322	0.14	**−0.59**	0.01	−0.06	0.366	0.22	**−0.51**	0.20	−0.18	−0.04	0.388	T2basalt
T2chalk	0.05	**0.70**	−0.02	0.508	0.05	**0.80**	−0.03	0.17	0.647	0.04	**0.77**	−0.12	0.06	0.23	0.657	T2chalk
T2quartz	−0.14	−0.21	−0.06	0.062	−0.15	*−0.35*	−0.08	*−0.32*	0.220	−0.12	−0.29	0.08	−0.18	−0.32	0.220	T2quartz
T2mix_m.	−0.03	*−0.47*	0.04	0.235	−0.01	*−0.34*	0.07	*0.36*	0.292	−0.04	*−0.42*	−0.04	0.14	0.28	0.306	T2mix_m.
T2no_tem	−0.06	−0.22	−0.20	0.071	−0.05	−0.21	−0.19	0.06	0.071	−0.17	*−0.32*	*−0.36*	0.13	−0.08	0.213	T2no_tem
T2organ.	0.03	0.00	0.28	0.078	0.02	−0.10	0.26	−0.25	0.134	−0.01	−0.11	0.15	0.22	−0.28	0.156	T2organ.
Rim_in	−0.22	−0.21	0.17	0.136	−0.19	0.02	0.21	**0.55**	0.408	−0.15	−0.01	0.19	0.07	**0.59**	0.438	Rim_in
Rim_out	0.11	−0.18	−0.32	0.114	0.13	−0.03	*−0.30*	*0.37*	0.219	0.17	−0.03	−0.17	−0.24	*0.40*	0.249	Rim_out
Rim_up	0.10	*0.33*	0.11	0.111	0.07	0.01	0.05	**−0.79**	0.635	0.00	0.03	−0.03	0.13	**−0.84**	0.724	Rim_up

	MR2	MR1	MR3		MR2	MR1	MR3	MR4		MR2	MR1	MR3	MR5	MR4
SS loadings	4.08	3.77	2.60	SS loadings	4.08	3.53	2.64	1.96	SS loadings	3.95	3.53	2.40	2.10	1.89
Proportion Var	0.13	0.12	0.08	Prop. Var	0.13	0.11	0.08	0.06	Proportion Var	0.12	0.11	0.07	0.07	0.06
Cumulative Var	0.13	0.25	**0.33**	Cum. Var	0.13	0.24	0.32	**0.38**	Cumulative Var	0.12	0.23	0.31	0.37	**0.43**
Prop. Explained	0.39	0.36	0.25	Prop. Expl.	0.33	0.29	0.22	0.16	Proportion Explained	0.28	0.25	0.17	0.15	0.14
The root mean square of the residuals (RMSR) is 0.09				RMSR is 0.09					RMSR is 0.08					

Fig. 5.171a Rotated factor solutions for kraters with dummies. Text formatting as above.

	KR 2 factor solution			KR 3 factor solution				KR 4 factor solution					KR 5 factor solution					
	MR1	MR2	h2	MR2	MR1	MR3	h2	MR2	MR1	MR3	MR4	h2	MR2	MR3	MR4	MR5	MR1	h2
	surface	core	comm.	surf.	core	size	comm.	surf.	core	size	darkn.	com.	core	ext.cl.	size	darkn.	int.col.	
Diam	0.13	0.06	0.022	−0.03	0.18	*0.44*	0.196	0.02	0.18	*0.44*	0.01	0.200	com					
R_max	0.25	*−0.33*	0.150	−0.01	−0.11	**0.81**	0.701	0.03	−0.13	**0.80**	0.02	0.691	0.15	−0.16	*0.42*	0.12	−0.07	0.217
Bel_r	0.28	−0.19	0.101	0.01	0.04	**0.86**	0.735	−0.03	0.05	**0.88**	−0.03	0.759	−0.13	0.00	**0.75**	0.03	0.02	0.620
Firing	0.14	−0.09	0.026	0.17	−0.12	−0.07	0.034	−0.15	−0.10	−0.06	0.03	0.033	0.05	0.02	**0.93**	−0.03	0.00	0.840
Temp_q	−0.05	*0.30*	0.087	−0.05	0.27	−0.04	0.078	0.23	0.22	−0.06	0.22	0.124	−0.14	0.00	−0.07	0.14	−0.09	0.042
Temp_s	−0.02	−0.16	0.028	−0.03	−0.15	0.03	0.027	0.06	−0.16	0.02	0.03	0.030	0.22	−0.07	−0.06	0.15	0.09	0.094
Tem2_q	0.12	−0.08	0.020	0.07	−0.03	0.17	0.039	0.14	−0.09	0.15	0.25	0.079	−0.16	0.00	0.01	0.02	0.04	0.027
Tem2_s	0.06	0.03	0.005	0.05	0.02	0.02	0.004	0.14	−0.02	0.01	0.23	0.038	−0.07	0.06	0.15	0.14	0.13	0.060
stratum	−0.13	0.04	0.016	−0.13	0.02	−0.01	0.016	0.10	0.03	−0.01	−0.04	0.016	−0.03	−0.01	0.01	0.21	0.12	0.040
hue_cor	0.09	**−0.80**	0.634	0.07	**−0.75**	0.11	0.593	0.08	**−0.80**	0.09	0.16	0.644	0.02	−0.09	−0.01	−0.01	0.04	0.016
hue_ex	**0.82**	−0.01	0.665	**0.86**	−0.02	−0.05	0.715	**−0.58**	−0.02	−0.03	*0.38*	0.684	**−0.76**	0.03	0.09	0.09	0.06	0.592
hue_in	**0.81**	−0.02	0.660	**0.79**	0.00	0.05	0.639	**−0.61**	0.02	0.07	0.27	0.631	0.01	**0.98**	0.01	0.01	0.03	0.963
val_cor	0.26	**0.55**	0.407	0.23	**0.55**	0.03	0.395	0.10	*0.49*	0.02	*0.45*	0.481	−0.03	*0.34*	0.03	*0.35*	*−0.39*	0.702
val_ex	**0.71**	0.06	0.525	**0.71**	0.06	0.02	0.528	−0.19	−0.04	−0.01	**0.74**	0.702	*0.46*	0.04	−0.02	*0.42*	0.08	0.480
val_in	**0.62**	0.14	0.418	**0.55**	0.17	0.15	0.401	−0.15	0.10	0.13	**0.56**	0.493	−0.02	*0.46*	−0.01	**0.50**	0.06	0.619
chr_cor	0.03	**0.91**	0.841	−0.01	**0.98**	0.02	0.950	0.02	**0.94**	0.02	0.06	0.905	0.02	−0.03	0.05	**0.79**	−0.12	0.700
chr_ex	**−0.71**	0.05	0.498	**−0.75**	0.06	0.06	0.533	**0.72**	0.01	0.03	−0.10	0.595	**0.99**	0.02	0.03	0.02	0.02	0.976
chr_in	**−0.65**	0.07	0.422	**−0.64**	0.06	−0.01	0.405	**0.82**	−0.03	−0.05	0.14	0.597	−0.02	**−0.63**	−0.02	0.10	*0.31*	0.610
													0.00	0.00	−0.01	−0.03	**0.99**	0.995

Fig. 5.171b Rotated factor solutions for kraters, loadings without categorical variables. Formatting as above. In the 5 factor solution factor 3 correlates with factors 5 (0.46) and 1 (-0.46).

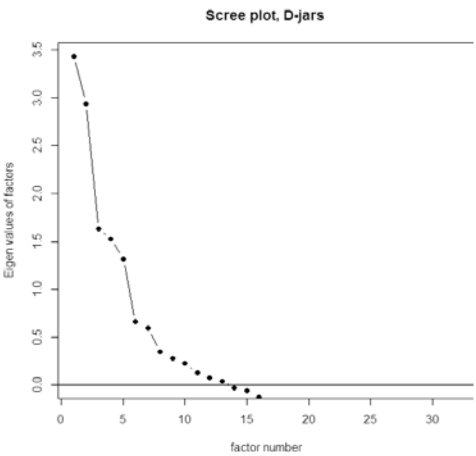
The factor solutions of kraters without dummies were dominated by color-variables. The size-related variables emerged in a relatively stable bundle as well: only in the two factor solution did their loadings remain low and overshadowed by the color-variables. In the four factor solution the color variables started to split onto two factors, while the variables related to tempering did not portray any consistent patterning.

When the categorical variables are included, all attributes of tempering load consistently on the first factor. The interpretations of factors in the three factor solution is essentially the same as in the three factor models of bowls (Fig. 5.167), or that of closed vessels (Fig. 5.163). The solutions with four and five extracted factors are very similar with those of bowls; the tempering attributes remain consistently loaded together on the first factor, and surface colors on the second. In the three and four factor models the size and colors in the core bundle together, while they divide onto two factors in the five factor solution. The connection between the core colors and the thickness-variables is reasonable, as the thick walls (and rims) tend to remain darker than thin walls, which during firing would more commonly be baked throughout, resulting in a core of the same color as the surfaces (if no coloring surface treatments are present). The direction of the rim receives a factor of its own in four and five factor solutions.

All three solutions can be considered reasonable in terms of the interpretation of the factors. The five factor solution is the only one where the diameter also has strong loadings with the other size related variables. The five factor model reaches in general higher loadings and communalities, accounting for 43 % of variance, while the three and four factor solutions remain at 33 % and 38 % respectively.

Open vessels differed considerably between the functional categories of cooking vessels vs. bowls and kraters. There are no such functional differences within the sub set of closed vessels. All of them are suitable for storing and transport of different amounts of goods, while the smaller containers may be used also for serving. The pattern of closed vessels analyzed as a separate sub-set was not very different from the pattern of the whole pottery assemblage, which may indicate a more homogeneous pattern across the closed vessel classes.

Jars



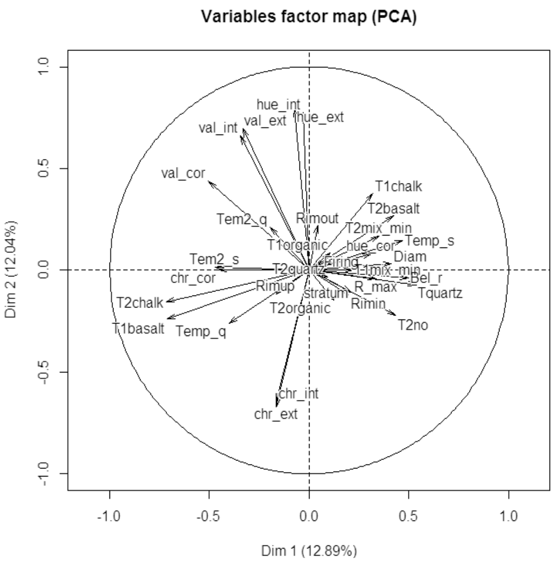


Fig. 5.172 a) Scree plot for factor solutions and b) Variables factor map for jars (with dummies).

Factor pattern matrices for jars analyzed together (three, four, five and six factor solutions) with dummy-variables of tempering material and direction of the rim part																						
	Jar 3 factor solution				Jar 4 factor solution					Jar 5 factor solution						Jars, 6 Factor solution						
used varia-bles	MR1	MR2	MR3	h2	MR2	MR1	MR3	MR4	h2	MR2	MR1	MR3	MR4	MR5	h2	MR2	MR1	MR4	MR3	MR5	MR6	h2
Diam	size 1temp.	surf. col.	2temp. rim dir.	comm.	surf. color	1te-mper	2temp rim d.	size	comm	surf. color	1te-mper	2temp. darkn.	size	core rim dir.	com	surf. color	1te-mper	size	2te-mper	core	rim direction	com.
R_max	**0.54**	−0.09	0.08	0.28	0.03	0.01	0.00	**0.80**	0.64	0.02	0.05	0.03	**0.79**	0.12	0.64	0.01	0.05	**0.76**	0.07	0.01	0.17	0.64
Bel_r	**0.56**	−0.21	0.25	0.36	−0.09	0.04	0.18	**0.77**	0.61	−0.02	−0.06	0.16	**0.82**	−0.15	0.69	0.06	−0.07	**0.86**	0.05	−0.02	−0.19	0.75
Firing	**0.63**	−0.18	0.05	0.41	−0.07	0.08	−0.02	**0.84**	0.74	0.00	0.02	−0.03	**0.87**	−0.05	0.78	0.02	0.02	**0.88**	−0.04	−0.07	0.02	0.81
Temp_q	0.06	0.04	−0.02	0.01	0.05	0.01	−0.03	0.09	0.01	0.07	−0.02	−0.03	0.10	−0.02	0.02	−0.03	−0.02	0.00	0.14	−0.22	0.23	0.09
Temp_s	*−0.34*	−0.25	0.18	0.23	−0.21	*−0.36*	0.16	−0.11	0.23	−0.17	*−0.43*	0.13	−0.06	−0.09	0.26	−0.09	*−0.43*	0.01	−0.01	0.11	−0.26	0.30
Tem2_q	**0.63**	−0.01	0.15	0.39	0.02	*0.38*	0.16	*0.47*	0.41	−0.09	**0.51**	0.17	*0.41*	0.10	0.47	−0.07	**0.52**	*0.41*	0.14	0.11	0.01	0.48
Tem2_s	0.22	0.02	**0.66**	0.44	0.08	0.08	**0.65**	0.15	0.44	−0.03	0.12	**0.66**	0.15	−0.09	0.44	−0.11	0.11	0.04	**0.78**	−0.16	0.02	0.58
stratum	−0.13	−0.11	**0.61**	0.41	−0.01	*−0.32*	**0.55**	0.13	0.44	−0.08	*−0.30*	**0.58**	0.15	−0.01	0.45	−0.11	*−0.31*	0.10	**0.61**	−0.01	−0.03	0.49
hue_cor	0.08	−0.07	−0.23	0.07	−0.08	0.04	−0.23	0.09	0.08	−0.13	0.15	−0.22	0.04	0.20	0.12	−0.14	0.16	0.03	−0.17	0.09	0.19	0.12
hue_ext	*0.34*	0.02	−0.01	0.12	−0.03	*0.44*	0.05	−0.03	0.19	0.24	0.03	−0.07	0.10	**−0.69**	0.55	0.10	0.02	−0.03	0.17	**−0.84**	−0.04	0.70
hue_int	0.02	**0.80**	0.07	0.65	**0.80**	0.08	0.02	−0.04	0.65	**0.84**	−0.02	0.12	−0.01	−0.05	0.72	**0.87**	−0.02	0.03	0.03	0.00	−0.06	0.75
val_cor	0.04	**0.78**	0.03	0.62	**0.77**	0.12	0.00	−0.07	0.62	**0.84**	0.00	0.08	−0.03	−0.11	0.71	**0.82**	−0.01	−0.03	0.07	−0.13	0.01	0.71
val_ext	−0.27	*0.41*	*0.41*	0.46	*0.46*	−0.29	*0.35*	−0.09	0.47	0.18	0.04	**0.50**	−0.19	**0.50**	0.67	0.24	0.05	−0.14	*0.36*	**0.59**	0.04	0.68
val_int	−0.08	**0.65**	*0.37*	0.61	**0.70**	−0.12	*0.30*	0.00	0.62	**0.57**	−0.02	*0.44*	−0.03	0.20	0.62	**0.58**	−0.02	−0.02	*0.39*	0.21	0.05	0.62
chr_cor	−0.04	**0.58**	*0.46*	0.60	**0.64**	−0.10	*0.40*	0.03	0.61	**0.50**	0.00	**0.53**	0.00	0.18	0.61	**0.50**	0.00	0.00	*0.48*	0.19	0.03	0.61
chr_ext	*−0.39*	0.04	0.18	0.21	0.10	*−0.46*	0.11	−0.05	0.25	−0.22	−0.03	0.24	−0.18	**0.70**	0.65	−0.07	−0.01	−0.04	−0.02	**0.89**	−0.02	0.80
chr_int	−0.08	**−0.73**	0.24	0.59	**−0.71**	−0.14	0.27	0.01	0.59	**−0.79**	−0.05	0.19	−0.02	0.02	0.65	**−0.81**	−0.04	−0.06	0.25	0.02	−0.03	0.70
T1basalt	−0.07	**−0.71**	0.25	0.56	**−0.68**	−0.15	0.28	0.03	0.56	**−0.76**	−0.06	0.20	0.00	0.02	0.61	**−0.75**	−0.06	−0.01	0.20	0.09	−0.10	0.62

T1chalk	**−0.68**	−0.16	0.17	0.56
T1quartz	*0.47*	0.26	0.16	0.31
T1mix_m.	0.27	−0.01	**−0.50**	0.36
T1organ.	0.27	−0.06	0.04	0.07
T2basalt	0.15	0.05	0.05	0.03
T2chalk	**0.50**	0.17	0.03	0.28
T2quartz	**−0.62**	−0.11	0.28	0.53
T2mix_m.	−0.05	0.03	−0.23	0.05
T2no_tem	**0.50**	0.04	0.15	0.25
T2organ.	0.03	−0.07	**−0.69**	0.49
Rim_in	0.05	−0.13	−0.12	0.04
Rim_out	0.15	−0.12	−0.12	0.06
Rim_up	−0.18	*0.36*	*−0.39*	0.27
	0.07	−0.23	*0.42*	0.21
	MR1	MR2	MR3	
SS loadings	3.78	3.76	2.98	
Proportion Var	0.12	0.12	0.09	
Cumulative Var	0.12	0.24	**0.33**	
Proportion Exp.	0.36	0.36	0.28	
The root mean square of the residuals (RMSR) is 0.1				

T1chalk	−0.06	**−0.82**	0.07	−0.05	0.70
T1quartz	0.20	**0.61**	0.24	−0.04	0.44
T1mix_m.	−0.08	*0.33*	*−0.45*	0.06	0.37
T1organ.	−0.08	0.26	0.07	0.08	0.08
T2basalt	0.03	0.18	0.07	0.01	0.04
T2chalk	0.10	**0.63**	0.12	−0.02	0.41
T2quartz	−0.03	**−0.65**	0.21	−0.18	0.56
T2mix_m.	0.02	−0.03	−0.24	−0.01	0.06
T2no_tem	0.05	*0.36*	0.17	*0.30*	0.25
T2organ.	−0.14	0.11	**−0.66**	−0.01	0.49
Rim_in	−0.16	0.09	−0.09	−0.03	0.04
Rim_out	−0.04	−0.22	−0.20	**0.50**	0.33
Rim_up	*0.37*	−0.23	*−0.46*	0.07	0.37
	−0.30	*0.34*	**0.53**	*−0.38*	0.58
	MR2	MR1	MR3	MR4	
SS loads.	3.76	3.46	2.84	2.81	
Prop. Var	0.12	0.11	0.09	0.09	
Cumu. Var	0.12	0.23	0.31	**0.40**	
Prp. Exp.	0.29	0.27	0.22	0.22	
RMSR is 0.09					

T1chalk	−0.01	**−0.86**	0.11	0.01	0.09	0.77
T1quartz	0.03	**0.76**	0.25	−0.13	0.06	0.62
T1mix_m.	−0.03	*0.33*	*−0.48*	0.03	0.02	0.38
T1organ.	−0.04	0.18	0.03	0.10	−0.18	0.09
T2basalt	0.10	0.06	0.03	0.04	−0.22	0.06
T2chalk	0.03	**0.67**	0.09	−0.06	−0.08	0.47
T2quartz	0.01	**−0.73**	0.23	−0.11	−0.03	0.64
T2mix_m.	−0.01	0.05	−0.22	−0.04	0.17	0.08
T2no_tem	0.00	*0.40*	0.16	0.27	−0.04	0.27
T2organ.	0.01	0.03	**−0.70**	0.00	−0.01	0.50
Rim_in	−0.11	0.04	−0.13	−0.02	−0.08	0.04
Rim_out	−0.11	−0.06	−0.14	*0.46*	*0.35*	0.36
Rim_up	0.28	−0.02	*−0.34*	0.00	**0.50**	0.43
	−0.17	0.06	*0.38*	−0.29	**−0.66**	0.68
	MR2	MR1	MR3	MR4	MR5	
SS load.	3.54	3.27	3.05	2.82	2.37	
Prop. V.	0.11	0.10	0.10	0.09	0.07	
Cum. Va.	0.11	0.21	0.31	0.40	**0.47**	
Pr. Expl.	0.24	0.22	0.20	0.19	0.16	
RMSR is 0.07						

T1chalk	−0.02	**−0.86**	0.00	0.12	0.05	0.07	0.79
T1quartz	0.03	**0.76**	−0.14	0.24	0.08	−0.03	0.62
T1mix_m.	−0.06	*0.34*	0.02	*−0.40*	−0.11	0.17	0.38
T1organ.	0.04	0.18	0.16	−0.10	−0.01	−0.27	0.14
T2basalt	0.09	0.06	0.03	0.06	−0.20	−0.08	0.07
T2chalk	0.06	**0.67**	−0.04	0.03	0.02	−0.16	0.47
T2quartz	0.03	**−0.73**	−0.10	0.18	0.05	−0.10	0.64
T2mix_m.	0.00	0.05	−0.02	−0.23	0.14	0.10	0.08
T2no_tem	−0.07	*0.39*	0.20	0.29	−0.16	0.12	0.31
T2organ.	0.03	0.04	0.05	**−0.72**	−0.05	0.06	0.55
Rim_in	−0.17	0.04	−0.07	−0.02	−0.19	0.10	0.07
Rim_out	−0.10	−0.05	*0.46*	−0.12	0.22	0.27	0.36
Rim_up	0.06	−0.01	−0.19	0.05	−0.07	**0.85**	0.74
	0.01	0.04	−0.13	0.03	−0.08	**−0.91**	0.88
	MR2	MR1	MR4	MR3	MR5	MR6	
SS loadings	3.48	3.28	2.71	2.70	2.31	2.08	
Prop. Var	0.11	0.10	0.08	0.08	0.07	0.07	
Cum. Var	0.11	0.21	0.30	0.38	0.45	**0.52**	
Prop. Expl.	0.21	0.20	0.16	0.16	0.14	0.13	
RMSR is 0.07							

Fig. 5.173a Rotated factor solutions for jars with dummies. Text formatting as above

	2 factor solution, jars			3 factor solution, jars				4 factor solution, jars					5 factor solution, jars					
	MR1	MR2	h2	MR2	MR1	MR3	h2	MR2	MR1	MR4	MR3	h2	MR3	MR4	MR2	MR1	MR5	h2
	surface col.	size core		surf.	size	core darkness		surf. col.	size	darkn. 2temper	core		size	darkn. 2temper	core	col.ex	col.in	
Diam	0.10	*−0.41*	0.167	−0.02	**0.70**	0.08	0.469	0.00	**0.70**	0.05	0.04	0.470	**0.71**	0.07	0.05	−0.10	−0.10	0.495
R_max	0.10	*−0.48*	0.226	−0.01	**0.80**	0.03	0.627	0.04	**0.80**	0.07	−0.01	0.638	**0.81**	0.04	−0.01	0.07	0.11	0.664
Bel_r	0.11	**−0.59**	0.341	0.00	**0.92**	−0.06	0.876	−0.03	**0.92**	−0.05	0.00	0.863	**0.87**	−0.05	−0.01	0.00	−0.03	0.776
Firing	0.04	−0.06	0.005	0.04	0.05	−0.02	0.005	0.02	0.05	0.07	−0.10	0.015	0.05	0.06	−0.11	0.02	0.04	0.017
Temp_q	−0.18	0.17	0.056	−0.19	−0.05	0.12	0.047	0.21	−0.05	0.08	0.07	0.056	−0.06	0.06	0.06	0.01	0.24	0.071
Temp_s	0.07	−0.24	0.057	0.00	*0.38*	0.06	0.142	0.01	*0.38*	0.05	0.01	0.143	*0.40*	0.06	0.02	−0.04	−0.04	0.155
Tem2_q	0.05	0.15	0.027	0.00	0.07	0.25	0.059	0.23	0.05	*0.45*	−0.17	0.183	0.05	*0.45*	−0.19	−0.10	0.10	0.194
Tem2_s	−0.06	0.24	0.057	−0.12	0.03	*0.31*	0.091	0.28	0.02	*0.41*	−0.05	0.167	0.03	*0.41*	−0.05	−0.14	0.13	0.171
stratum	−0.09	−0.09	0.017	−0.08	0.07	−0.06	0.018	−0.04	0.08	−0.19	0.13	0.048	0.07	−0.18	0.14	−0.04	−0.05	0.050
hue_cor	0.19	*−0.41*	0.186	0.27	0.00	*−0.45*	0.228	0.05	−0.03	0.13	**−0.83**	0.656	−0.03	0.11	**−0.83**	0.02	0.05	0.659
hue_ex	**0.85**	0.08	0.746	**0.82**	−0.01	0.13	0.736	**−0.72**	−0.02	0.28	−0.03	0.725	−0.02	0.16	−0.04	**0.84**	0.01	0.820
hue_in	**0.79**	0.01	0.624	**0.78**	−0.02	0.05	0.630	**−0.62**	−0.03	0.27	−0.13	0.591	−0.03	*0.30*	−0.14	0.23	**−0.53**	0.682
val_cor	0.15	**0.68**	0.512	0.02	−0.08	**0.81**	0.691	0.03	−0.11	**0.59**	*0.39*	0.621	−0.11	**0.60**	*0.39*	−0.07	−0.10	0.634
val_ex	**0.51**	*0.41*	0.493	*0.43*	0.02	**0.54**	0.554	−0.22	−0.01	**0.69**	0.04	0.623	−0.01	**0.60**	0.04	*0.36*	0.06	0.617
val_in	*0.44*	*0.43*	0.423	*0.34*	0.05	**0.59**	0.526	−0.07	0.02	**0.80**	−0.02	0.671	0.02	**0.76**	−0.01	0.05	−0.12	0.639
chr_cor	−0.18	**0.61**	0.370	−0.29	−0.04	**0.65**	0.446	0.07	−0.02	0.13	**0.86**	0.822	−0.03	0.13	**0.81**	0.03	0.11	0.757
chr_ex	**−0.77**	0.14	0.587	**−0.78**	−0.02	0.11	0.596	**0.90**	−0.03	0.10	−0.05	0.749	−0.03	0.19	−0.06	**−0.75**	0.23	0.748
chr_in	**−0.69**	0.16	0.467	**−0.71**	0.00	0.13	0.486	**0.74**	0.00	0.06	0.05	0.533	−0.01	0.00	0.02	−0.05	**0.83**	0.749

Fig. 5.173b Rotated factor loadings for jars without dummies. Text formatting as above.

The variables factor map (Fig. 5.172b) indicates that colors as well as some of the tempering attributes will be prominent in the defining of the factors, while the rim directions and rare tempering material are close to the origin, indicating a small effect on the factor models. The scree plot of jars with the categorical variables included (Fig. 5.172a) has the most dramatic increases of variance accounted for at the points where the third and sixth factors are included in the analyses, thus presenting two clear elbows. I ran solutions from two to seven factors. However, the solution of two factors only was clearly under-factored: the first extracted factor received fair to strong loadings of size, temper, and core-color attributes, and the surface colors dominated the second factor. The first factor in particular included several domains. At the other end of the trials, in the seven factor model, tempering related attributes started to split on three factors, complicating the interpretation of the model. Three, four, five, and six factor solutions (Fig. 5.173a) all provided a basis for reasonable factor interpretations.

Without dummies (Fig. 5.173b), the colors and size-related variables dominated the solutions. The amount and particle size of the secondary temper reached significant levels, but still had relatively weak loadings in the four and five factor solutions. They loaded on the same factor with darkness, which is hard to explain. In the five factor solution, the surface colors started to split on two factors that correlated with each other (at -0.62), complicating the interpretation. Without the categorical variables, the three and four factor models were the most insightful for interpretation.

When the categorical variables of tempering materials and directions of the rim part are included (Fig. 5.173a), the domain of tempering gains in prominence in the factor pattern structure throughout the solutions, while the rim direction is less dominant, receiving strong loadings only from the four factor solution onwards. Throughout the solutions, tempering attributes load on two factors (the first and third): the first factor receives loadings of the quantity and particle size of the main temper, together with the most commonly used tempering materials of basalt and chalk, while the quantity and particle size of the secondary temper load on the third factor, together with the less common main temper of quartz in jars and the absence of a secondary temper. Thus, there is some overlap in the main and secondary tempering attributes.

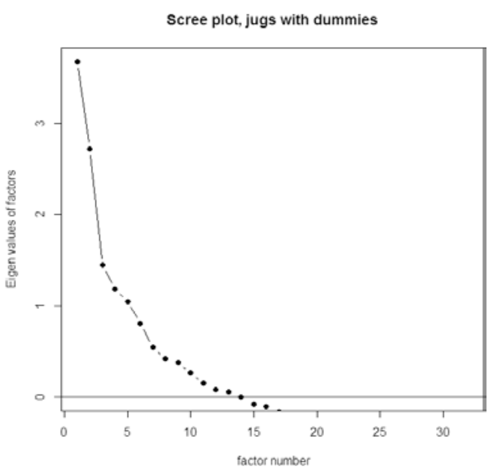
In the three factor solution with categorical variables, the size attributes and variables relating to tempering dominate the first factor. Such an association between size and tempering was already present in the three factor solution without dummies, only with tempering receiving lower loadings. This association probably indicates under-factoring, as there is no substance based reason for such an association and it disappears in models with more factors extracted. The second factor is dominated by surface colors, making the factor easy to interpret. The third factor receives fair loadings related to (mainly secondary) tempering and the direction of the rim part – another less appealing association. The darkness of the pottery tends to load on two factors in most solutions, both with dummies and without them. In the three factor solution without dummies, the darkness attributes load together with other color variables of the core, making a reasonable bundle – unfortunately one that is not stable but splits in other solutions. The surface colors stay bundled in most solutions.

In the four factor solution, the size related attributes receive a factor of their own. The surface colors stay bundled together, and the tempering attributes load on factors 1 and 3. In the four factor solution without dummies, the darkness was separated from other color attributes. With dummies, the darkness of the surfaces loads together with other surface colors, while the colors of the core receive only weak loadings in general, and the darkness (value) of the core loads mostly with other darkness related variables.

The structures of five factor solutions, with and without dummies, have many similarities: size attributes have one factor, colors in the core load together, and the darkness variables bundle together and associate with the secondary temper. This last association, however, is hard to explain. Such an association appears in the four and five factor solutions without dummies and in the five factor solution with dummies: the attributes of the secondary temper load together with the darkness. This may hint at some connection between tempering recipes and clay properties that are reflected in the colors of the pottery. Another option is that the association indicates under-factoring, as it disappears in the six factor solution with dummies. With dummies, all the surface colors load together, while without dummies they started to split on two factors in the five factor solution. Without dummies, all the darkness attributes loaded together, while with dummies the darkness (value) attributes always load on two factors, the values of surfaces always with other surface colors, and the values of the core load together with other core colors in five and six factor models and always somehow associate with other color variables. The same instability of the darkness of the core was observed in other vessel classes as well. The six factor solution (with dummies) differs from the five factor solution only in that the rim direction receives a factor of its own, and therefore the solution does not include associations that would be hard to explain.

The solutions of five and six factors provide factors that are the easiest to interpret. They naturally also have the highest proportion of variance accounted for: 47 % and 52 % for the four and five factor solutions respectively. This is clearly more than in the solutions of three and four factors (33 % and 40 % respectively).

Jugs



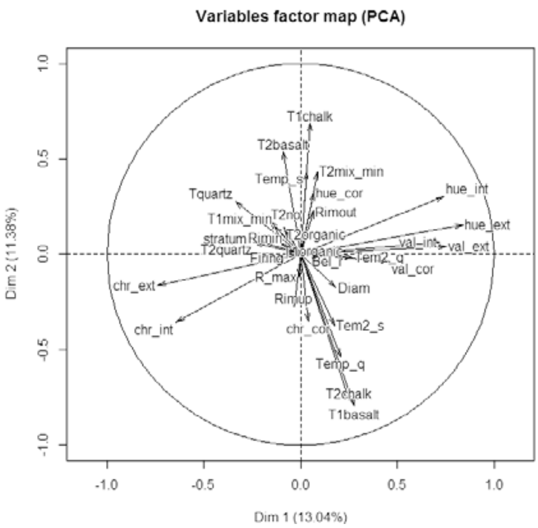


Fig. 5.174 a) Scree plot for factor solutions and b) Variables factor map for jugs.

Factor pattern matrices for jugs - three, four and five factor solutions with dummy-variables of tempering material and direction of the rim part																
used varia- bles	Jug 3 factor solution				Jug 4 factor solution					Jug 5 factor solution						used varia- bles
	MR1 surf. color	MR2 tem- pers	MR3 core color	h2 comm.	MR1 surf. color	MR2 1.te- mper	MR3 core color	MR4 2.te- mper	h2 com.	MR1 surf. color	MR2 1.te- mper	MR3 core color	MR4 2.te- mper	MR5 rim d. (size)	h2 comm.	
Diam	0.14	0.15	0.21	0.094	0.14	−0.14	0.21	0.01	0.094	0.09	−0.13	*0.30*	0.15	0.24	0.191	Diam
R_max	−0.04	0.11	0.04	0.016	−0.01	−0.16	0.01	−0.10	0.033	−0.09	−0.14	0.15	0.11	*0.42*	0.216	R_max
Bel_r	0.05	0.05	−0.10	0.014	0.12	−0.19	−0.19	−0.27	0.133	0.03	−0.18	−0.05	−0.06	*0.47*	0.248	Bel_r
Firing	−0.08	0.08	*−0.31*	0.103	−0.09	−0.05	*−0.30*	0.10	0.103	−0.10	−0.05	−0.29	0.12	0.03	0.103	Firing
Temp_q	0.06	**0.58**	0.01	0.344	0.03	*−0.45*	0.10	*0.34*	0.371	0.03	*−0.45*	0.10	*0.34*	−0.09	0.374	Temp_q
Temp_s	0.14	*−0.41*	−0.05	0.192	0.05	**0.55**	0.03	0.26	0.351	0.03	**0.56**	0.06	*0.30*	0.03	0.388	Temp_s
Tem2_q	0.25	0.19	*−0.30*	0.176	0.11	0.11	−0.12	**0.67**	0.500	0.07	0.12	−0.06	**0.76**	0.04	0.603	Tem2_q
Tem2_s	0.06	**0.50**	−0.23	0.277	−0.03	−0.26	−0.08	**0.59**	0.440	−0.05	−0.25	−0.04	**0.64**	−0.02	0.491	Tem2_s
stratum	−0.23	−0.17	0.06	0.086	−0.20	0.09	0.01	−0.19	0.098	−0.21	0.09	0.02	−0.18	0.07	0.099	stratum
hue_cor	0.13	−0.02	**−0.78**	0.627	0.13	0.00	**−0.80**	0.02	0.655	0.14	−0.01	**−0.81**	0.01	0.04	0.688	hue_cor
hue_ext	**0.85**	0.05	0.01	0.728	**0.86**	−0.04	0.01	0.01	0.739	**0.86**	−0.04	0.01	0.02	0.04	0.742	hue_ext
hue_int	**0.79**	−0.04	−0.21	0.674	**0.78**	0.07	−0.21	0.06	0.678	**0.78**	0.06	−0.22	0.06	0.02	0.688	hue_int
val_cor	*0.46*	−0.06	**0.57**	0.525	*0.46*	0.05	**0.57**	−0.08	0.526	*0.46*	0.06	**0.58**	−0.08	0.00	0.530	val_cor
val_ext	**0.75**	0.06	0.23	0.613	**0.75**	−0.04	0.23	0.01	0.615	**0.76**	−0.05	0.22	−0.02	−0.04	0.620	val_ext
val_int	**0.72**	0.03	0.21	0.559	**0.71**	−0.01	0.22	0.04	0.559	**0.72**	−0.01	0.20	0.01	−0.04	0.562	val_int
chr_cor	−0.03	0.06	**0.82**	0.695	−0.02	−0.06	**0.83**	−0.05	0.709	−0.04	−0.04	**0.86**	−0.02	0.00	0.753	chr_cor
chr_ext	**−0.76**	−0.03	0.04	0.576	**−0.79**	0.08	0.08	0.10	0.623	**−0.79**	0.09	0.08	0.09	−0.07	0.631	chr_ext

chr_int	**−0.71**	0.11	0.25	0.582	**−0.70**	−0.12	0.25	−0.03	0.586	**−0.70**	−0.12	0.26	−0.03	−0.03	0.596	chr_int
T1basalt	0.06	**0.88**	−0.05	0.764	0.09	**−0.84**	−0.02	0.19	0.779	0.09	**−0.84**	−0.02	0.18	−0.05	0.780	T1basalt
T1chalk	0.22	**−0.64**	−0.09	0.479	0.12	**0.79**	0.00	0.24	0.673	0.14	**0.79**	−0.04	0.19	−0.13	0.673	T1chalk
T1quartz	−0.25	*−0.39*	0.10	0.220	−0.24	*0.34*	0.07	−0.17	0.220	−0.27	*0.34*	0.10	−0.11	0.14	0.240	T1quartz
T1mix_m.	−0.09	−0.22	0.12	0.066	0.00	0.01	0.00	*−0.47*	0.223	0.01	0.01	−0.02	**−0.50**	0.05	0.251	T1mix_m.
T1organ.	−0.08	−0.06	−0.04	0.013	−0.07	0.04	−0.05	−0.05	0.014	−0.10	0.04	−0.01	0.02	0.14	0.033	T1organ.
T2basalt	0.05	**−0.58**	0.05	0.329	−0.03	**0.68**	0.11	0.14	0.456	−0.06	**0.69**	0.16	0.21	0.11	0.525	T2basalt
T2chalk	0.05	**0.77**	0.14	0.647	0.06	**−0.71**	0.18	0.21	0.647	0.05	**−0.70**	0.20	0.23	−0.02	0.653	T2chalk
T2quartz	−0.23	0.02	*−0.39*	0.204	−0.20	−0.09	*−0.44*	−0.10	0.238	−0.20	−0.10	*−0.44*	−0.09	0.05	0.245	T2quartz
T2mix_m.	0.20	*−0.42*	0.03	0.211	0.18	*0.41*	0.02	−0.07	0.214	0.19	*0.41*	0.01	−0.09	−0.02	0.216	T2mix_m.
T2no_tem	−0.10	*−0.30*	0.24	0.140	0.03	0.01	0.06	**−0.67**	0.448	0.06	0.00	0.01	**−0.74**	0.00	0.539	T2no_tem
T2organ.	−0.04	−0.18	0.06	0.035	−0.06	0.20	0.06	0.00	0.042	−0.01	0.19	−0.02	−0.13	−0.25	0.104	T2organ.
Rim_in	−0.05	−0.09	−0.17	0.044	−0.06	0.10	−0.17	0.03	0.044	−0.08	0.10	−0.14	0.06	0.07	0.048	Rim_in
Rim_out	0.12	−0.17	−0.12	0.062	0.21	−0.02	−0.24	*−0.41*	0.244	0.04	0.00	0.02	−0.01	**0.85**	0.732	Rim_out
Rim_up	−0.10	0.20	0.18	0.094	−0.18	−0.01	0.30	*0.40*	0.265	−0.01	−0.04	0.04	−0.02	**−0.87**	0.779	Rim_up

	MR1	MR2	MR3
SS loadings	4.15	3.58	2.46
Proportion Var	0.13	0.11	0.08
Cumulative Var	0.13	0.24	**0.32**
Prop. Explained	0.41	0.35	0.24

The root mean square of the residuals (RMSR) is 0.1

	MR1	MR2	MR3	MR4
SS loading	4.10	3.39	2.48	2.35
Prop. Var	0.13	0.11	0.08	0.07
Cum. Var	0.13	0.23	0.31	**0.38**
Prop. Expl.	0.33	0.27	0.20	0.19

RMSR is 0.09

	MR1	MR2	MR3	MR4	MR5
SS loadings	4.08	3.37	2.46	2.32	2.11
Proportion Var	0.13	0.11	0.08	0.07	0.07
Cumulative Var	0.13	0.23	0.31	0.38	**0.45**
Prop. Explained	0.28	0.24	0.17	0.16	0.15

RMSR is 0.08

Fig. 5.175a Rotated factor solutions for jugs with dummies. Text formatting as above.

Jugs, 6 Factor solution (with dummies)

	MR1 surf. colors	MR2 1tem-per	MR3 core color	MR4 2tem-per	MR5 rim direc	MR6 size	h2 com.
Diam	0.11	−0.07	0.24	0.13	0.05	*0.41*	0.28
R_max	−0.05	−0.01	0.03	0.09	0.04	**0.79**	0.64
Bel_r	0.07	−0.07	−0.14	−0.08	0.16	**0.66**	0.51
Firing	−0.10	−0.06	−0.28	0.12	0.06	−0.04	0.10
Temp_q	0.02	*−0.46*	0.11	*0.33*	−0.06	−0.05	0.38
Temp_s	0.03	**0.55**	0.06	*0.31*	0.06	−0.04	0.39
Tem2_q	0.07	0.12	−0.08	**0.76**	0.00	0.09	0.61
Tem2_s	−0.05	−0.27	−0.04	**0.64**	−0.01	0.01	0.49
stratum	−0.22	0.05	0.06	−0.17	0.20	−0.22	0.17
hue_cor	0.14	−0.01	**−0.82**	0.02	0.02	0.01	0.70
hue_ext	**0.86**	−0.04	0.00	0.02	0.02	0.05	0.74
hue_int	**0.78**	0.04	−0.20	0.06	0.07	−0.11	0.70
val_cor	*0.46*	0.05	**0.58**	−0.07	0.03	−0.03	0.54
val_ext	**0.76**	−0.03	0.20	−0.02	−0.08	0.07	0.63
val_int	**0.72**	−0.01	0.20	0.01	−0.04	−0.02	0.56
chr_cor	−0.04	−0.06	**0.87**	−0.03	0.04	−0.04	0.78
chr_ext	**−0.79**	0.07	0.09	0.09	−0.03	−0.06	0.63
chr_int	**−0.69**	−0.10	0.24	−0.04	−0.09	0.12	0.61
T1basalt	0.08	**−0.87**	0.00	0.17	0.02	−0.12	0.82
T1chalk	0.13	**0.77**	−0.03	0.21	−0.08	−0.14	0.67
Tquartz	−0.27	*0.36*	0.09	−0.11	0.10	0.09	0.24
T1mix_min	0.02	0.03	−0.03	**−0.50**	0.02	0.06	0.26
T1organic	−0.07	0.14	−0.09	0.01	−0.13	**0.53**	0.32
T2basalt	−0.06	**0.67**	0.17	0.22	0.17	−0.09	0.54
T2chalk	0.05	**−0.70**	0.19	0.21	−0.07	0.10	0.65
T2quartz	−0.21	−0.13	*−0.40*	−0.09	0.16	−0.20	0.29
T2mix_min	0.21	*0.46*	−0.04	−0.09	−0.15	0.23	0.32
T2no	0.06	0.01	0.01	**−0.74**	−0.01	−0.01	0.54
T2organic	−0.01	0.17	−0.01	−0.12	−0.20	−0.14	0.10
Rimin	−0.06	0.14	−0.18	0.06	−0.05	0.22	0.10
Rimout	0.03	−0.02	0.05	−0.01	**0.96**	−0.02	0.92
Rimup	0.00	−0.03	0.02	−0.01	**−0.94**	−0.07	0.89

	MR1	MR2	MR3	MR4	MR5	MR6
SS loadings	4.08	3.37	2.45	2.31	2.07	1.85
Proportion Var	0.13	0.11	0.08	0.07	0.06	0.06
Cumulative Var	0.13	0.23	0.31	0.38	0.45	**0.50**
Proportion Explained	0.25	0.21	0.15	0.14	0.13	0.11

The root mean square of the residuals (RMSR) is 0.07

Fig. 5.175a continuing

2 factor solution, jugs				3 factor solution, jugs				4 factor solution, jugs					5 factor solution, jugs						used varia-bles
	MR1 surf.c.	MR2 core c.	h2 com	MR1 col.ex	MR2 core	MR3 col.in	h2 com	MR1 col.ex. sf.dark.	MR2 core	MR3 col.in	MR4 size temper	h2 com	MR3 col.ex. sf.dark	MR2 core	MR4 col. in	MR1 size	MR5 temper	h2 com.	
Diam	0.15	0.18	0.051	*0.43*	0.06	*0.35*	0.150	*0.32*	0.07	−0.28	0.29	0.205	0.28	0.09	−0.19	0.26	0.10	0.179	Diam
R_max	−0.02	0.04	0.020	0.29	−0.08	*0.38*	0.093	0.17	−0.09	*−0.33*	*0.44*	0.281	−0.01	0.01	0.00	**1.00**	0.01	0.995	R_max
Bel_r	0.05	−0.08	0.009	0.23	−0.15	0.21	0.048	0.19	−0.18	−0.22	*0.30*	0.155	0.05	−0.08	0.04	*0.49*	−0.07	0.246	Bel_r
Firing	−0.08	−0.23	0.057	0.02	−0.26	0.14	0.069	0.03	−0.26	−0.14	−0.03	0.068	0.05	−0.27	−0.17	−0.06	0.04	0.076	Firing
Temp_q	0.07	0.15	0.027	0.16	0.11	0.09	0.035	−0.07	0.16	0.08	*0.43*	0.201	0.05	0.11	−0.08	0.04	*0.48*	0.260	Temp_q
Temp_s	0.08	−0.06	0.010	−0.10	0.00	−0.23	0.037	−0.19	0.02	*0.31*	0.15	0.080	−0.15	−0.01	0.24	0.04	0.15	0.066	Temp_s
Tem2_q	0.14	−0.08	0.025	0.07	−0.06	−0.10	0.028	−0.15	−0.02	0.28	*0.44*	0.235	−0.05	−0.07	0.12	0.03	**0.55**	0.321	Tem2_q
Tem2_s	0.05	0.00	0.002	0.05	−0.01	−0.01	0.003	−0.16	0.04	0.19	*0.37*	0.148	−0.05	−0.02	0.00	−0.01	**0.50**	0.244	Tem2_s

stratum	−0.19	0.02	0.038	*−0.34*	0.09	−0.17	0.077	−0.20	0.06	0.06	−0.27	0.118	−0.27	0.09	0.16	−0.01	−0.27	0.139	stratum
hue_cor	0.10	**−0.81**	0.670	0.04	**−0.81**	−0.08	0.686	0.02	**−0.78**	0.10	0.04	0.657	0.00	**−0.74**	0.11	0.00	0.07	0.596	hue_cor
hue_ex	**0.88**	0.00	0.782	**0.84**	−0.05	−0.11	0.832	**0.76**	−0.04	0.17	0.07	0.773	**0.78**	−0.04	0.16	0.02	0.05	0.786	hue_ext
hue_in	**0.72**	−0.19	0.568	0.17	−0.04	**−0.77**	0.784	0.19	−0.06	**0.74**	0.07	0.762	0.15	−0.03	**0.77**	−0.04	0.12	0.794	hue_int
val_cor	*0.41*	*0.49*	0.386	0.29	*0.49*	−0.15	0.379	*0.32*	**0.50**	0.14	−0.01	0.401	*0.34*	*0.46*	0.10	0.00	−0.01	0.370	val_cor
val_ex	**0.73**	0.16	0.550	**0.80**	0.07	0.06	0.598	**0.80**	0.10	−0.04	0.00	0.620	**0.87**	0.02	−0.12	−0.01	−0.01	0.658	val_ext
val_in	**0.65**	0.17	0.443	**0.53**	0.16	−0.17	0.434	**0.53**	0.18	0.19	0.05	0.461	**0.60**	0.11	0.09	−0.08	0.10	0.468	val_int
chr_cor	0.00	**0.91**	0.830	−0.01	**0.92**	−0.01	0.841	−0.02	**0.86**	0.00	0.04	0.735	−0.03	**1.00**	0.03	0.00	0.03	0.987	chr_cor
chr_ex	**−0.77**	0.07	0.603	**−0.68**	0.10	0.14	0.595	**−0.75**	0.13	−0.09	0.09	0.645	**−0.67**	0.09	−0.19	−0.04	0.14	0.629	chr_ext
chr_in	**−0.62**	0.20	0.440	−0.01	0.02	**0.83**	0.702	−0.11	0.06	**−0.74**	0.05	0.673	0.02	0.00	**−0.89**	−0.01	0.06	0.773	chr_int
				Factors MR1 and MR3 correlate at −0.58				Factors MR1 and MR4 correlate at 0.54					Factors MR3 and MR4 correlate at 0.55.						

Fig. 5.175b Rotated factor loadings for jugs without dummies. Text formatting as above.

The scree plot (Fig. 5.174a) indicates that at least three factors will be needed for a reasonable model. The variables factor map (Fig. 5.174b) indicates that colors and some of the tempering attributes have strong correlations, indicated by long arrows, while the size related variables, close to the origin, have weak correlations and therefore a small impact in the models. Indeed, this is evident especially in the three and four factor models (Fig. 5.175a).

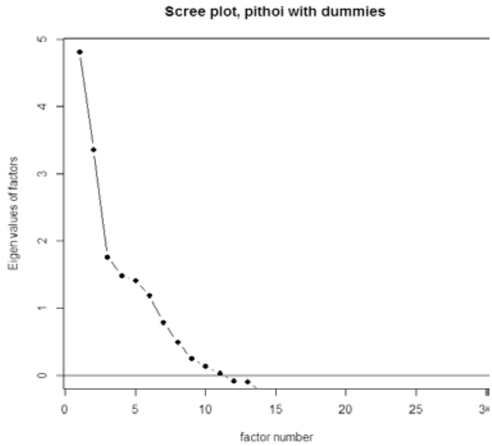
The factor solutions of jugs without dummies (Fig. 175b) were dominated by colors. The size-related variables loaded on two factors, making the interpretation difficult. The variables related to tempering started to emerge in the four factor solution, but their loadings remained low. At the same time the surface colors started to split on different factors, complicating the interpretation. The models also included factors that correlated with each other.

When categorical variables are included (Fig. 5.175a), the tempering related variables gain in prominence, while the size related one continues to have weak loadings, especially in the solutions with fewer factors. The size attributes start to emerge from the four factor solution onwards. In the five factor solution, while the loadings are still relatively weak; their association with the direction of the rim part is a reasonable one, as both features relate to the forming of the vessel.

The surface colors always load together on the first factor, as do the colors of the core on the third, making the colors a stable bundle. The tempering attributes first appear all together on the second factor. From the three factor solution onwards, the tempering attributes start to divide onto two factors. The second factor receives loadings of the quantity and particle size of the main temper and the most common set of used materials, basalt and chalk. The fourth factor is dominated by the quantity and particle size of the secondary temper, and the use of mixed minerals as the main temper and the absence of the secondary tempering material. The observations of quartz as the main tempering material receives weak loadings on the second factor, while its use as the secondary material is associated with core colors, a connection that seems hard to explain. However, the weak loading may be incidental.

In the six factor solution the tempering related variables start to load on three factors, complicating the model. At the same time, it is the only solution with strong loadings of size attributes. However, the size related variables form a bundle, though a relatively weak one, already in the five factor model. Thus the five factor solution appears to be more sensible than the six factor solution. This model accounts for 45 % of the variance observed in the sub-set of jugs (of the variables used in the analyses).

Pithoi



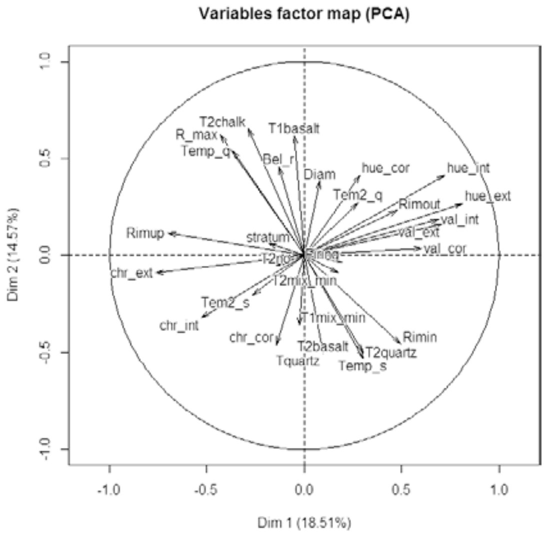


Fig. 5.176 a) Scree plot for factor solutions and b) Variables factor map for pithoi.

Factor pattern matrices for pithoi - three, four and five factor solutions with dummy-variables of tempering material and direction of the rim part

Pt 3 factor solution

used varia-bles	MR1	MR2	MR3	h2
	colors	size	temper	com.
		1temp	q&s	material
	rim	directions		
Diam	0.29	*0.40*	0.01	0.21
R_max	−0.16	**0.57**	*−0.42*	0.61
Bel_r	0.12	*0.48*	−0.11	0.26
Firing	0.15	−0.11	0.00	0.04
Temp_q	−0.06	**0.59**	−0.19	0.43
Temp_s	−0.02	**−0.65**	0.07	0.44
Tem2_q	*0.39*	0.17	−0.02	0.16
Tem2_s	*−0.31*	−0.02	0.16	0.12
stratum	−0.17	0.02	−0.18	0.06
hue_cor	*0.48*	*0.34*	0.00	0.31
hue_ext	**0.87**	−0.01	0.03	0.75
hue_int	**0.84**	0.11	−0.10	0.70
val_cor	**0.55**	−0.18	0.04	0.37
val_ext	**0.74**	−0.02	0.13	0.56
val_int	**0.72**	−0.02	0.06	0.53
chr_cor	*−0.39*	*−0.45*	0.01	0.30
chr_ext	**−0.75**	0.12	−0.13	0.62
chr_int	**−0.57**	0.03	0.26	0.40
T1basalt	0.08	0.10	**−0.86**	0.78
T1quartz	0.04	0.05	**0.93**	0.85
T1mix_m.	−0.16	−0.19	0.28	0.15
T2basalt	0.04	0.05	**0.93**	0.85
T2chalk	0.07	**0.68**	−0.20	0.53
T2quartz	−0.07	**−0.78**	−0.17	0.60
T2mix_m.	0.10	−0.17	0.00	0.04
T2no_tem	−0.18	−0.07	−0.10	0.04
Rim_in	0.14	**−0.79**	−0.15	0.66
Rim_out	**0.51**	0.00	−0.12	0.28
Rim_up	**−0.50**	**0.52**	0.18	0.61
	MR1	MR2	MR3	
SS loadings	5.13	4.00	3.15	
Proportion Var	0.18	0.14	0.11	
Cumulative Var	0.18	0.31	**0.42**	
Proportion Expl.	0.42	0.33	0.26	
Root mean square of the residuals (RMSR) is 0.13				

Pt 4 factor solution

used varia-bles	MR1	MR2	MR3	MR4	h2
	surf.c	size	tem-	core	com.
	core-	1temp	per	colors	
	darkn	rim d	mat.		
Diam	*0.31*	*0.42*	−0.01	0.03	0.23
R_max	−0.18	**0.52**	*−0.43*	0.15	0.61
Bel_r	0.02	*0.36*	−0.10	*0.34*	0.28
Firing	0.07	−0.20	0.02	0.20	0.09
Temp_q	−0.09	**0.55**	−0.20	0.17	0.43
Temp_s	0.00	**−0.61**	0.09	−0.17	0.44
Tem2_q	*0.48*	0.28	−0.06	−0.19	0.28
Tem2_s	*−0.31*	−0.03	0.17	0.00	0.13
stratum	*−0.31*	−0.15	−0.13	*0.35*	0.21
hue_cor	0.23	0.03	0.06	**0.75**	0.65
hue_ext	**0.87**	−0.01	0.01	0.04	0.77
hue_int	**0.79**	0.05	−0.10	0.19	0.70
val_cor	**0.73**	0.04	−0.02	*−0.46*	0.67
val_ext	**0.69**	−0.07	0.14	0.17	0.57
val_int	**0.67**	−0.08	0.07	0.18	0.53
chr_cor	−0.08	−0.07	−0.07	**−0.89**	0.83
chr_ext	**−0.75**	0.11	−0.13	−0.03	0.62
chr_int	**−0.58**	0.03	0.27	−0.02	0.42
T1basalt	0.00	−0.02	**−0.85**	0.25	0.80
T1quartz	−0.01	0.01	**0.95**	0.13	0.89
T1mix_m.	0.01	0.01	0.24	*−0.48*	0.30
T2basalt	−0.01	0.01	**0.95**	0.13	0.89
T2chalk	0.08	**0.69**	−0.23	0.08	0.57
T2quartz	−0.12	**−0.83**	−0.13	0.01	0.67
T2mix_m.	0.28	0.05	−0.05	*−0.48*	0.28
T2no_tem	−0.25	−0.15	−0.08	0.16	0.09
Rim_in	0.07	**−0.86**	−0.10	0.06	0.75
Rim_out	*0.49*	−0.04	−0.12	0.11	0.28
Rim_up	*−0.43*	**0.60**	0.16	−0.12	0.64
	MR1	MR2	MR3	MR4	
SS loadings	4.98	3.78	3.15	2.72	
Prop. Var	0.17	0.13	0.11	0.09	
Cum. Var	0.17	0.30	0.41	**0.50**	
Prop. Expl.	0.34	0.26	0.22	0.19	
RMSR is 0.11					

Pt 5 Factor solution

used varia-bles	MR1	MR2	MR3	MR4	MR5	h2
	surf.	size	tem-	core	2te-	
	core	temp.	per	colors	mper	
	darkn	rim	mat		rim	
Diam	0.15	*0.48*	0.04	0.01	*0.42*	0.41
R_max	−0.29	**0.56**	*−0.39*	0.13	0.23	0.70
Bel_r	−0.03	*0.36*	−0.09	*0.34*	0.09	0.29
Firing	0.12	−0.23	0.01	0.21	−0.12	0.12
Temp_q	0.05	*0.47*	−0.26	0.21	*−0.45*	0.59
Temp_s	−0.06	**−0.57**	0.12	−0.19	0.24	0.47
Tem2_q	**0.58**	0.23	−0.11	−0.15	−0.25	0.38
Tem2_s	−0.03	−0.15	0.07	0.06	**−0.79**	0.65
stratum	*−0.34*	−0.14	−0.12	*0.34*	0.06	0.22
hue_cor	0.17	0.03	0.07	**0.75**	0.12	0.65
hue_ext	**0.86**	−0.02	0.00	0.06	0.07	0.79
hue_int	**0.74**	0.04	−0.10	0.21	0.16	0.70
val_cor	**0.73**	0.03	−0.02	*−0.45*	0.08	0.67
val_ext	**0.75**	−0.12	0.10	0.21	−0.14	0.66
val_int	**0.61**	−0.07	0.08	0.18	0.18	0.53
chr_cor	−0.07	−0.05	−0.06	**−0.91**	0.03	0.84
chr_ext	**−0.72**	0.12	−0.12	−0.04	−0.12	0.63
chr_int	**−0.57**	0.05	0.28	−0.04	−0.05	0.43
T1basalt	0.00	−0.05	**−0.86**	0.25	0.00	0.82
T1quartz	−0.01	0.03	**0.95**	0.13	−0.02	0.90
T1mix_m.	0.01	0.03	0.24	*−0.48*	0.02	0.30
T2basalt	−0.01	0.03	**0.95**	0.13	−0.02	0.90
T2chalk	0.13	**0.65**	−0.25	0.10	−0.17	0.59
T2quartz	−0.06	**−0.86**	−0.15	0.01	−0.11	0.72
T2mix_m.	0.25	0.07	−0.04	*−0.49*	0.12	0.29
T2no_tem	*−0.45*	−0.05	0.00	0.10	**0.54**	0.41
Rim_in	0.12	**−0.88**	−0.12	0.06	−0.08	0.80
Rim_out	0.22	0.07	−0.03	0.06	**0.75**	0.67
Rim_up	−0.26	**0.53**	0.10	−0.09	**−0.53**	0.76
	MR1	MR2	MR3	MR4	MR5	
SS loadings	4.68	3.72	3.16	2.75	2.57	
Prop. Var	0.16	0.13	0.11	0.09	0.09	
Cumu. Var	0.16	0.29	0.40	0.49	**0.58**	
Prop. Expl.	0.28	0.22	0.19	0.16	0.15	
RMSR is 0.09						

Pt 6 Factor solution

used varia-bles	MR1	MR2	MR3	MR5	MR4	MR6	h2
	surf.c	size	temp.	1tem-	core	2tem-	com.
	core-	2temp	mat.	per	colors	per	
	darkn.	rimin		rim.d			
Diam	0.11	**0.58**	0.04	*0.32*	0.02	−0.12	0.44
R_max	*−0.30*	**0.58**	*−0.39*	0.03	0.13	−0.15	0.71
Bel_r	0.05	0.29	−0.08	−0.20	*0.33*	−0.24	0.34
Firing	−0.06	−0.10	0.00	0.36	0.24	*0.49*	0.41
Temp_q	0.11	0.26	−0.24	**−0.68**	0.18	0.03	0.69
Temp_s	−0.15	*−0.39*	0.10	**0.59**	−0.17	0.13	0.60
Tem2_q	*0.44*	0.25	−0.11	0.01	−0.14	*0.46*	0.47
Tem2_s	−0.19	−0.21	0.07	*−0.30*	0.07	**0.74**	0.77
stratum	*−0.35*	−0.11	−0.12	0.11	*0.34*	−0.03	0.23
hue_cor	0.17	0.06	0.07	0.12	**0.76**	−0.01	0.66
hue_ext	**0.87**	−0.02	0.00	0.06	0.06	0.03	0.80
hue_int	**0.73**	0.08	−0.10	0.17	0.21	0.03	0.70
val_cor	**0.76**	0.02	−0.03	0.00	*−0.46*	−0.04	0.71
val_ext	**0.79**	−0.18	0.11	−0.17	0.20	0.05	0.72
val_int	**0.62**	−0.03	0.07	0.19	0.18	−0.03	0.53
chr_cor	−0.08	−0.03	−0.07	0.04	**−0.91**	−0.01	0.84
chr_ext	**−0.73**	0.09	−0.12	−0.13	−0.04	0.01	0.63
chr_int	**−0.59**	0.06	0.28	−0.01	−0.03	0.02	0.44
T1basalt	0.05	−0.11	**−0.85**	−0.15	0.23	−0.14	0.84
T1quartz	0.03	0.02	**0.96**	−0.05	0.13	−0.05	0.91
T1mix_m.	−0.10	0.13	0.23	0.26	*−0.46*	0.25	0.42
T2basalt	0.03	0.02	**0.96**	−0.05	0.13	−0.05	0.91
T2chalk	−0.05	**0.70**	−0.25	0.03	0.13	*0.46*	0.84
T2quartz	−0.02	**−0.86**	−0.16	0.06	−0.01	0.00	0.73
T2mix_m.	0.35	0.01	−0.04	−0.14	**−0.51**	−0.28	0.42
T2no_tem	−0.22	−0.09	0.00	0.00	0.07	**−0.80**	0.70
Rim_in	0.13	**−0.85**	−0.13	0.17	0.06	0.09	0.80
Rim_out	0.14	*0.32*	−0.05	**0.83**	0.09	−0.13	0.85
Rim_up	−0.20	*0.31*	0.12	**−0.76**	−0.11	0.04	0.85
	MR1	MR2	MR3	MR5	MR4	MR6	
SS loadings	4.65	3.41	3.16	2.83	2.75	2.18	
Prop. Var	0.16	0.12	0.11	0.10	0.09	0.08	
Cumu. Var	0.16	0.28	0.39	0.48	0.58	**0.65**	
Prop. Expl.	0.24	0.18	0.17	0.15	0.15	0.11	
RMSR is 0.08							

Fig. 5.177a Rotated factor solutions for pithoi with dummies. Text formatting as above.

2 factor solution, Pt				3 factor solution, Pt				4 factor solution, Pt					used varia-bles
	MR2 surface color	MR1 core color	h2 com	MR2 surface color	MR1 core color	MR3 size temper	h2 comm.	MR3 exterior color	MR2 interior color	MR4 core color	MR1 size temper	h2 comm.	
Diam	0.08	0.06	0.011	0.17	−0.02	0.28	0.085	0.03	0.09	−0.01	0.24	0.064	Diam
R_max	*−0.36*	0.20	0.145	−0.09	−0.02	**0.85**	0.755	**−0.52**	*0.30*	0.00	**0.59**	0.650	R_max
Bel_r	−0.09	0.25	0.060	0.11	0.10	**0.60**	0.374	0.01	0.02	0.07	**0.66**	0.452	Bel_r
Firing	0.07	0.14	0.029	−0.02	0.21	−0.27	0.095	0.12	−0.10	0.21	−0.25	0.107	Firing
Temp_q	−0.12	0.24	0.062	0.01	0.15	*0.37*	0.179	−0.05	0.04	0.10	**0.51**	0.301	Temp_q
Temp_s	0.11	−0.21	0.049	−0.04	−0.10	*−0.46*	0.231	−0.22	0.23	−0.02	**−0.79**	0.657	Temp_s
Tem2_q	*0.32*	−0.06	0.099	*0.39*	−0.11	0.20	0.146	0.06	*0.36*	−0.10	0.10	0.150	Tem2_q
Tem2_s	−0.25	0.02	0.063	*−0.31*	0.07	−0.17	0.096	−0.13	−0.18	0.05	−0.09	0.070	Tem2_s
stratum	−0.22	0.19	0.071	−0.20	0.18	0.06	0.071	−0.27	0.05	0.19	−0.03	0.087	stratum
hue_cor	0.11	**0.85**	0.770	0.11	**0.84**	0.01	0.751	−0.01	0.15	**0.85**	−0.05	0.779	hue_cor
hue_ext	**0.92**	0.01	0.853	**0.91**	0.01	−0.05	0.858	**0.73**	*0.37*	0.00	0.04	0.891	hue_ext
hue_int	**0.74**	0.20	0.643	**0.80**	0.14	0.17	0.682	0.12	**0.90**	0.16	−0.06	0.995	hue_int
val_cor	**0.66**	*−0.40*	0.494	**0.64**	*−0.39*	−0.08	0.497	*0.34*	*0.41*	*−0.38*	−0.07	0.470	val_cor
val_ext	**0.76**	0.13	0.622	**0.70**	0.18	−0.18	0.643	**0.75**	0.11	0.15	0.03	0.692	val_ext
val_int	**0.57**	0.12	0.370	**0.57**	0.11	0.00	0.365	*0.31*	*0.36*	0.12	−0.04	0.354	val_int
chr_cor	0.00	**−0.98**	0.960	0.01	**−1.00**	−0.01	0.995	−0.04	0.04	**−0.99**	−0.06	0.995	chr_cor
chr_ext	**−0.80**	0.03	0.638	**−0.74**	−0.02	0.19	0.645	**−0.89**	−0.02	0.01	−0.04	0.799	chr_ext
chr_int	**−0.59**	0.00	0.350	**−0.66**	0.07	−0.20	0.402	−0.07	**−0.74**	0.05	0.00	0.580	chr_int
								MR2 and MR3 correlate at 0.4					

Fig. 5.177b Rotated factor loadings for pithoi without dummies. Text formatting as above.

The scree plot (Fig. 5.176a) indicates that at least three factors will be needed to reach a decent amount of variance accounted for. The variables factor map (Fig. 5.176b) shows most of the used variables spread out, only two (secondary) rare tempering materials, firing, and stratum remain close to the origin, and constantly have only low loadings (Fig. 5.177a and b). The solutions made without categorical variables (Fig. 5.177b) were dominated by the color attributes, which occupied the first factors in all solutions (according to surfaces versus colors in the core). From the three factor solution on, a bundle of size variables adds to the pattern, but the tempering attributes remain low throughout the solutions. From the four factor model onwards the color related variables started to split on several factors, complicating the models. At the same time, these color factors of inner versus exterior surfaces correlate with each other, indicating that they are related.

With categorical variables included (Fig. 5.177a), the three factor solution of pithoi seems to present under-factoring. This was also the case for a two factor solution, where all color variables dominated the first factor with fair loadings of rim directions, and the second factor was dominated by tempering and size attributes. In the three factor solution, the color variables on the first factor do make a sensible bundle, as well as the tempering related variables on the third factor, but the second factor with size, tempering, and rim directions clearly gathers aspects of several domains. Size and rim directions could both be related to the forming of the vessel, while the tempering is a distinct process. However, these two solutions are the ones where color attributes bundle together, even though the hue and chroma of the core load on both factors in the two factor model and on two first factors in the three factor model. The tempering attributes, as well as the direction of the rim part, already load on two factors in the three factor solution. The size related variables bundle together with some of the tempering attributes in most solutions. The complex picture of tempering attributes is a stable feature across most models of pithoi.

When categorical variables are included, the colors occupy two factors of the four factor solution onwards, and the surface colors dominate the first factor together with the darkness of the core. The other colors of the core dominate the fourth factor. However, the darkness of the core also loads together with the other colors of the core – a phenomenon that appears already without dummies included as well as in the factor models done for other sub sets. The association between the direction of the rim part and size attributes appears in the solutions with four and five factors extracted.

In the four factor solution, the attributes of tempering load on two factors. The quantity and particle size of the main temper, and the commonly appearing secondary tempering materials of chalk and quartz, load on the second factor, while two common main tempering materials (basalt and quartz) and one relatively common secondary tempering material (basalt) dominate the third factor. At the same time, the tempering quantities and particle size of the secondary temper load weakly with the surface colors, and observed mixed minerals as the main or secondary temper load weakly with the core colors. These associations are hard to explain. In the five factor solution, the tempering attributes spread out even more, and the rim directions also load on two factors, adding to the complexity of the model. In the six factor solution tempering related variables start to split on three factors, complicating the model even more. The model with four factors remains the most sensible one, where most associations are reasonable and the variance accounted for already reaches 50 %, which can be considered a relatively high percentage.

<u>Small containers</u>

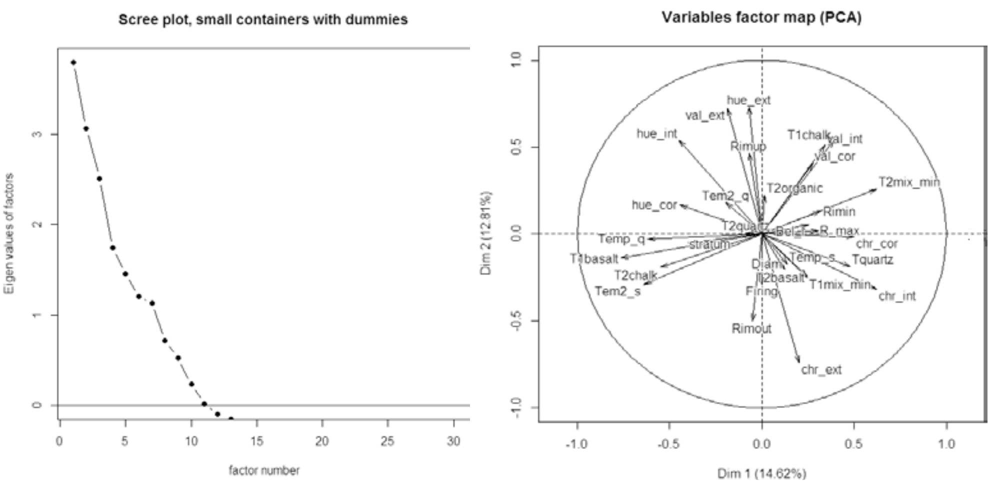


Fig. 5.178 a) Scree plot for factor solutions and b) Variables factor map for small containers (flasks, juglets, pyxides, and goblets).

According to the scree plot (Fig. 5.178a), it seems reasonable to expect good results from the four and five factor solutions when the categorical variables are included. The variables factor map shows most variables spread around, indicating that the loadings may remain relatively low.

Factor pattern matrices for small containers - three, four and five factor solutions with dummy-variables of tempering material and direction of the rim part

used variables	SC 3 factor solution				SC 4 factor solution					SC 5 factor solution						used variables
	MR1 tem-pers	MR3 size colors	MR2 colors rim d	h2 comm.	MR1 tem-pers	MR2 surf.c c.dark	MR3 core hu&ch	MR4 size rim d.	h2 com.	MR1 tem-pers	MR2 surf.c c.dark	MR3 core hu&ch	MR5 size	MR4 rim dir.	h2 com.	
Diam	0.26	*0.46*	-0.14	0.288	0.22	*-0.31*	-0.03	**0.69**	0.59	*-0.30*	*-0.39*	-0.08	**0.58**	-0.16	0.60	Diam
R_max	-0.05	*0.49*	0.07	0.250	-0.09	-0.10	-0.05	**0.72**	0.53	0.06	-0.09	0.05	**0.79**	-0.08	0.64	R_max
Bel_r	0.07	**0.53**	0.17	0.299	0.03	0.02	0.03	**0.69**	0.48	0.03	0.12	0.14	**0.92**	0.17	0.87	Bel_r
Firing	0.09	0.04	-0.26	0.079	0.09	-0.17	0.22	-0.17	0.11	0.06	-0.05	0.06	0.04	*0.44*	0.21	Firing
Temp_q	**0.59**	-0.19	0.17	0.431	**0.60**	0.03	*-0.40*	0.20	0.56	**-0.68**	-0.06	0.23	0.03	-0.26	0.59	Temp_q
Temp_s	*-0.40*	*-0.38*	*-0.40*	0.427	*-0.39*	*-0.39*	-0.18	*-0.34*	0.43	**0.52**	-0.22	*0.43*	-0.11	0.22	0.53	Temp_s
Tem2_q	-0.25	**-0.55**	0.02	0.349	-0.22	-0.09	**-0.58**	-0.17	0.41	0.22	-0.03	**0.57**	-0.10	-0.21	0.43	Tem2_q
Tem2_s	**0.74**	-0.11	-0.06	0.577	**0.75**	-0.06	-0.04	-0.04	0.58	**-0.64**	0.01	0.23	0.05	*0.31*	0.61	Tem2_s
stratum	*0.36*	-0.18	0.06	0.175	*0.38*	0.12	0.02	-0.24	0.21	-0.29	0.18	0.11	-0.16	0.23	0.22	stratum
hue_cor	0.09	**-0.53**	0.13	0.318	0.11	-0.04	**-0.69**	0.01	0.49	-0.03	0.09	**0.82**	0.21	-0.05	0.70	hue_cor
hue_ext	-0.14	-0.06	**0.73**	0.560	-0.12	**0.79**	0.01	-0.14	0.66	0.15	**0.83**	0.02	-0.01	0.00	0.71	hue_ext
hue_int	0.10	*-0.40*	**0.56**	0.507	0.13	**0.54**	*-0.35*	-0.19	0.51	-0.05	**0.65**	*0.48*	0.02	0.06	0.67	hue_int
val_cor	-0.19	*0.34*	*0.44*	0.344	-0.20	*0.49*	0.27	0.14	0.38	0.20	**0.50**	-0.25	0.23	0.06	0.42	val_cor
val_ext	0.11	0.08	**0.82**	0.685	0.13	**0.88**	0.09	-0.02	0.78	-0.13	**0.88**	-0.12	0.05	-0.01	0.80	val_ext
val_int	-0.16	**0.50**	**0.56**	0.578	-0.18	**0.60**	*0.32*	0.29	0.60	0.06	*0.47*	**-0.54**	0.16	-0.22	0.63	val_int
chr_cor	-0.11	**0.65**	0.05	0.447	-0.14	0.24	**0.77**	0.06	0.67	0.09	0.13	**-0.85**	-0.06	0.13	0.75	chr_cor
chr_ext	0.03	0.14	**-0.75**	0.591	0.01	**-0.77**	0.13	0.10	0.63	0.05	**-0.72**	0.01	0.13	0.23	0.63	chr_ext
chr_int	-0.20	**0.65**	*-0.31*	0.602	-0.25	*-0.31*	*0.45*	*0.42*	0.61	0.15	*-0.42*	**-0.59**	0.25	-0.08	0.68	chr_int
T1basalt	**0.83**	-0.14	0.14	0.745	**0.84**	0.12	-0.11	-0.02	0.75	**-0.83**	0.09	0.11	-0.09	0.07	0.76	T1basalt
T1chalk	**-0.79**	-0.27	0.24	0.744	**-0.78**	0.16	*-0.39*	-0.04	0.77	**0.65**	0.11	0.15	-0.12	**-0.52**	0.78	T1chalk
T1quartz	-0.18	*0.45*	-0.19	0.287	-0.21	-0.21	0.26	*0.32*	0.30	0.25	-0.16	-0.15	*0.44*	0.18	0.36	T1quartz
T1mix_m.	-0.21	0.04	*-0.32*	0.147	-0.21	-0.16	*0.37*	*-0.33*	0.29	*0.30*	-0.10	-0.21	-0.25	*0.31*	0.29	T1mix_m.
T2basalt	*-0.37*	-0.20	*-0.44*	0.345	*-0.36*	*-0.33*	0.13	*-0.42*	0.42	**0.50**	-0.19	0.12	-0.23	*0.34*	0.46	T2basalt
T2chalk	**0.64**	-0.07	0.02	0.426	**0.65**	0.00	-0.06	0.02	0.43	**-0.73**	-0.12	-0.11	-0.22	-0.14	0.60	T2chalk
T2quartz	0.18	0.11	0.09	0.048	0.18	0.19	0.25	-0.11	0.12	-0.04	*0.30*	0.00	0.11	*0.41*	0.24	T2quartz
T2mix_m.	**-0.51**	*0.39*	0.15	0.466	**-0.54**	0.08	0.06	*0.42*	0.51	*0.44*	0.02	-0.21	*0.38*	-0.26	0.51	T2mix_m.
T2organ.	*-0.37*	*-0.39*	0.04	0.269	*-0.35*	-0.06	*-0.45*	-0.09	0.31	*0.30*	-0.04	*0.36*	-0.10	-0.29	0.31	T2organ.
Rim_in	-0.06	*0.48*	0.20	0.268	-0.09	0.10	0.08	**0.55**	0.35	0.06	0.09	-0.11	**0.59**	-0.07	0.40	Rim_in
Rim_out	0.25	0.08	*-0.46*	0.289	0.26	-0.25	**0.52**	*-0.39*	0.52	0.00	-0.06	-0.05	-0.08	**0.80**	0.67	Rim_out
Rim_up	-0.24	-0.27	*0.40*	0.293	-0.23	0.22	**-0.57**	0.19	0.44	-0.02	0.03	0.09	-0.14	**-0.81**	0.68	Rim_up

	MR1	MR3	MR2
SS loadings	4.01	3.94	3.88
Proportion Var	0.13	0.13	0.13
Cumulative Var	0.13	0.27	**0.39**
Prop. Explained	0.34	0.33	0.33

RMSR is 0.14

	MR1	MR2	MR3	MR4
SS loadings	4.07	3.74	3.44	3.20
Prop. Var	0.14	0.12	0.11	0.11
Cum. Var	0.14	0.26	0.38	**0.48**
Prop. Expl.	0.28	0.26	0.24	0.22

RMSR is 0.12

	MR1	MR2	MR3	MR5	MR4
SS loadings	3.88	3.59	3.38	3.03	2.90
Prop. Var	0.13	0.12	0.11	0.10	0.10
Cum. Var	0.13	0.25	0.36	0.46	**0.56**
Prop. Expl.	0.23	0.21	0.20	0.18	0.17

RMSR is 0.11

Fig. 5.179a Rotated factor solutions for small containers with dummies. Text formatting as above.

	2 factor solution, SC			3 factor solution, SC				4 factor solution					5 factor solution						used variables
	MR1 size temper int.col	MR2 surf- darkness ext.col	h2 com.	MR1 ext.c. darkn.	MR2 int.c. core c.	MR3 size	h2 com	MR3 core int.c	MR1 ext.c. darkn.	MR2 size	MR4 ext.col core	h2 com darkn.	MR2 core int. col.	MR1 darkn. surf. ext.c.	MR3 size	MR4 core darkn. ext.c.	MR5 tem-pers	h2 com.	
Diam	*0.33*	-0.17	0.15	-0.21	-0.09	**0.54**	0.36	0.01	-0.02	**0.93**	-0.20	0.89	0.08	-0.02	**0.81**	*-0.35*	-0.03	0.77	Diam
R_max	*0.41*	0.02	0.17	-0.01	-0.07	**0.78**	0.63	-0.03	-0.13	**0.52**	*0.38*	0.45	-0.01	0.07	**0.68**	0.16	0.02	0.49	R_max
Bel_r	0.22	0.12	0.06	0.10	0.14	**0.83**	0.69	0.16	0.04	**0.71**	*0.42*	0.70	0.12	-0.01	**0.81**	*0.30*	0.09	0.74	Bel_r
Firing	0.11	-0.19	0.05	-0.20	-0.04	0.11	0.06	-0.09	*-0.37*	-0.20	*0.31*	0.21	-0.20	*0.39*	-0.06	0.28	0.10	0.20	Firing
Temp_q	*-0.33*	-0.09	0.11	-0.05	*0.37*	0.03	0.13	*0.36*	-0.02	0.01	-0.05	0.13	0.10	0.13	0.01	-0.02	**0.81**	0.69	Temp_q
Temp_s	-0.27	*-0.35*	0.18	*-0.33*	0.28	-0.08	0.18	0.27	*-0.33*	-0.08	0.03	0.18	*0.46*	0.29	-0.12	0.09	**-0.63**	0.65	Temp_s
Tem2_q	-0.24	-0.14	0.07	-0.13	*0.32*	0.04	0.11	*0.32*	-0.29	*-0.32*	*0.32*	0.34	*0.34*	0.25	-0.19	0.28	0.00	0.29	Tem2_q
Tem2_s	*-0.34*	-0.10	0.12	-0.06	*0.35*	0.00	0.13	*0.33*	-0.02	0.05	-0.08	0.11	0.15	0.13	0.00	0.00	*0.49*	0.30	Tem2_s
stratum	*-0.39*	0.03	0.15	0.07	0.28	-0.22	0.15	0.24	0.14	-0.10	-0.23	0.14	0.11	-0.06	-0.21	-0.09	0.23	0.14	stratum
hue_cor	*-0.48*	-0.09	0.23	-0.06	**0.72**	*0.34*	0.57	**0.77**	-0.16	0.12	*0.31*	0.68	**0.74**	0.14	0.19	0.28	0.04	0.67	hue_cor
hue_ext	-0.08	**0.69**	0.50	**0.70**	0.09	0.10	0.52	0.08	**0.51**	-0.19	**0.59**	0.80	0.08	*-0.44*	-0.08	**0.68**	-0.05	0.82	hue_ext
hue_int	**-0.53**	*0.42*	0.49	*0.47*	**0.57**	0.08	0.58	**0.55**	*0.37*	-0.08	*0.31*	0.62	*0.44*	-0.26	-0.06	*0.45*	0.19	0.61	hue_int
val_cor	*0.31*	*0.40*	0.24	*0.37*	-0.20	*0.31*	0.27	-0.22	0.15	0.05	**0.70**	0.61	-0.27	-0.05	0.18	**0.74**	-0.07	0.68	val_cor
val_ext	-0.11	**0.91**	0.86	**0.94**	0.04	0.01	0.88	0.05	**0.89**	-0.01	0.11	0.85	0.05	**-0.84**	-0.02	0.18	0.10	0.84	val_ext
val_int	**0.55**	**0.69**	0.71	**0.63**	**-0.55**	0.16	0.70	*-0.48*	**0.62**	0.27	0.09	0.69	*-0.35*	**-0.69**	0.27	-0.01	-0.21	0.75	val_int
chr_cor	**0.63**	0.20	0.41	0.15	**-0.73**	-0.06	0.52	**-0.81**	0.03	-0.19	0.25	0.70	**-0.90**	0.05	-0.12	0.28	-0.01	0.84	chr_cor
chr_ext	0.22	**-0.72**	0.60	**-0.74**	-0.07	0.21	0.62	-0.09	**-0.79**	0.12	0.07	0.67	-0.17	**0.79**	0.17	-0.01	-0.01	0.70	chr_ext
chr_int	**0.90**	-0.20	0.89	-0.29	**-0.76**	*0.32*	0.86	**-0.71**	*-0.36*	0.24	0.21	0.81	**-0.64**	0.28	*0.35*	0.00	-0.16	0.73	chr_int

Fig. 5.179b Rotated factor loadings for small containers without dummies. Text formatting as above.

Throughout all solutions (both with dummies and without), the color attributes have fair to strong loadings, but their pattern is to some extent different from that in all other vessel classes (Figs. 5.179a and b). The colors on the exterior surface always load together (with dummies as well as without). The colors in the core mainly load together, while the darkness of the core loads most strongly with the color attributes of the exterior surface, and to some extent also with other color variables in the core. The hue and brightness (chroma) of the core always load together. All interior colors tend to load on two or three factors, partly with the colors of the exterior surface and partly with the colors of the core. This may relate to the generally very small openings of the small containers, which affects the reduced oxidizing during the baking. For this reason, the inner surface color of the small containers is often similar to that of the core (see Figs. 5.111–113). Variables related to size make a stable bundle that also always loads together across all solutions – the loadings are only generally weak in the three factor solution (with dummies) and in two factor solution (without dummies).

The differences of the models with categorical variables included and those without them appear in the loadings related to tempering. While they received only weak loadings in most solutions without dummies, the main tempering quantity and particle size load strongly only in the five factor solution, and the loadings relating to the secondary temper remain under 0.50 in all models. When the tempering materials are included as dummy variables, the tempering attributes dominate the first factor in all solutions (even though the quantity of the secondary temper loads together with surface colors – a phenomenon that is hard to explain). Thus, the tempering attributes form a factor that is easy to interpret. The direction of the rim part loads on two factors, loading partly with size attributes (which is reasonable) and partly with colors of the core, until the five factor solution, where they dominate the fifth factor.

The three factor solution seems to present under-factoring, while the size colors appear together with core colors. It accounts for only 33 % of the variance in the material. The models with four and five factors (categorical variables included) provide the most sensible solutions. The variance accounted for is 48 % in the four factor model and 56 % in the five factor model.

Summary and conclusions of Factor analyses of the Tel Kinrot pottery

Even though there are differences between the analyzed vessel groups, it is noteworthy that there are patterns that are stable throughout all the vessel classes, a result I did not expect. Color variables tend to group together on two or three factors, so that the colors in the core are bundled together while the colors on the surfaces mainly load together, while in some solutions, and especially in small containers, the surface colors divide onto two factors. The size-related variables of diameter and thickness also relate to each other, and tend to load on one factor. The variables relating to tempering pattern constantly together – if the tempering materials are included in the analyses (as dummy variables), while only in a few solutions do they load together without the raw material included as dummies. This indicates that the inclusion of categorical variables added to the sensibility of the factor analyses. Only the quantities and particle sizes of the main and secondary tempering did not form stable patterns within the subgroups. This is natural, as in the tempering recipes the potters use certain materials in distinctive ways. When categorical variables are included, the correlations between factors that appeared in some solutions without the categorical variables disappear.

Without dummies, the most interpretable three and four factor solutions generally accounted for 32–49 % of the variance in the observed variables in the material. Even though the features related to the tempering did not generally have strong loadings, they often loaded on the same factor as the size-related variables (at least partially). This may indicate that the model of factors and measured variables presented in Fig. 2.6 is right in positioning the function to affect variables related both to tempering and size. With dummies, the most sensible solutions tended to be those with four and five factors for most vessel classes. The three factor solutions often appeared to be under factored and to have a low percentage of variance accounted for by the models (29–34 % for most vessel classes, and 42 % and 39 % for pithoi and small containers), while the four and five factor models reach a proportion of variance accounted for of 37–56 % (for cooking pots slightly lower, 35 % in the four factor solution, and for pithoi slightly higher, 58 % and 65 % in the four and five factor models respectively).

The model of measurement in Fig. 2.6 included four factors. The division of loadings of color aspects on two factors might indicate the existence of another factor that was not included in the model. Variables of darkness and all color variables of the core generally loaded together, while the hue and brightness of the color on the surfaces formed another variable bundle. It might be reasonable to divide the factor of clay properties and firing technique in the model presented in Fig. 2.6 into two factors. This may, however, be difficult, because the factors affecting the colors are notoriously difficult to define and would require further, probably experimental studies on clay processing and pottery baking.

5.3.3.2 Relationships between Categorical Variables: Correspondence Analysis

While the factor analysis is based on correlations between variables, it is best applicable to variables of at least ordinal levels of measurement. Therefore, it leaves some important variables outside the scope: the categorical variables. Similar to the factor analysis, the main objective of correspondence analysis (CA) is "to reduce the dimensionality of a data matrix and visualize it in a subspace of low-dimensionality, commonly two- or three dimensional" (Nenadić & Greenacre 2007: 2). The major difference is that correspondence analysis is especially suitable for categorical variables and frequency data, and analyzing differences between relative frequencies (Greenacre & Primicerio 2013: 165). As CA is based on contingency tables of two variables, it does not produce any new information, but only makes the co-occurrences more visual and therefore easier to find. In the contingency table that is the source of correspondence analysis, the observations are on the rows and qualitative variables in the columns.

"The data of interest in simple CA is usually a two-way contingency table or any other table of nonnegative ratio-scale data for which relative values are of primary interest" (Nenadić & Greenacre 2007: 2). Since no correlations can be calculated for categorical variables, the variability is measured from the row profiles of a contingency table. The total variance of the data matrix is measured by *inertia* (Greenacre 2007: Chapter 4), which resembles a χ^2 statistic calculated on the relative observed and expected frequencies (Nenadić & Greenacre 2007: 3). The proximities that a correspondence analysis plots are based on frequencies of co-occurrences, and thus on χ^2 measures of distance. Mathematically the χ^2 distance is a weighted Euclidian geometric distance calculated on relative counts. The table that is used for the correspondence analysis is created by converting the observed original frequencies into relative ones by dividing the rows by the row totals. The resulting rows of relative frequencies are called *profiles*. The distances are calculated between the profiles (Greenacre & Primicerio 2013: 54–55).

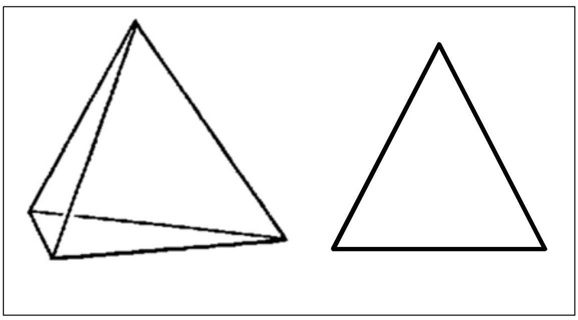


Fig. 5.180. Tetrahedron and a corresponding triangle

Fig. 5.180 illustrates the idea of correspondence analysis, which is to examine a phenomenon of many dimensions in fewer dimensions, like flattening a tetrahedron into a triangle, a shape that approximates the fundamental properties of the phenomenon while making it easier to grasp. This is actually the basic idea of all modelling.

The following figures display the associations of *categorical* variables that appear within the Tel Kinrot pottery assemblage. The categories include vessel class, rim form, and tempering material, of which the rim forms have not been included in the analyses above, as there are too many classes to include as dummy variables in factor analyses.

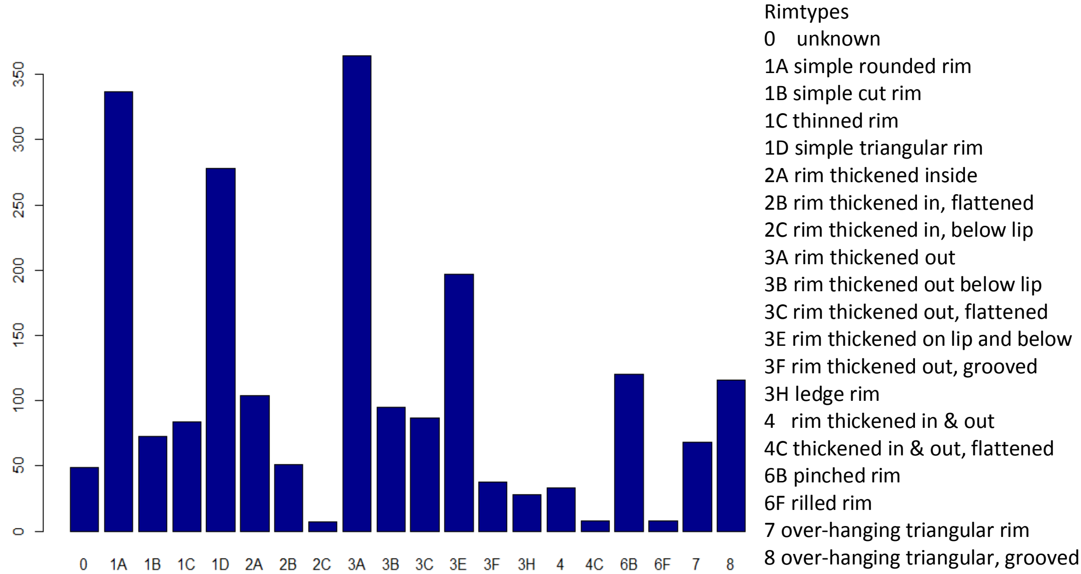


Fig. 5.181a Frequencies of the rim types after some close forms have been combined. The frequencies of the rarest rim forms of 2C, 4C, and 6F are 7 and 8, while those of the most common rim forms of 3A and 1A are 364 and 337 respectively.

in	out	up
427	547	1184

Fig. 5.181b. Direction of the rim part

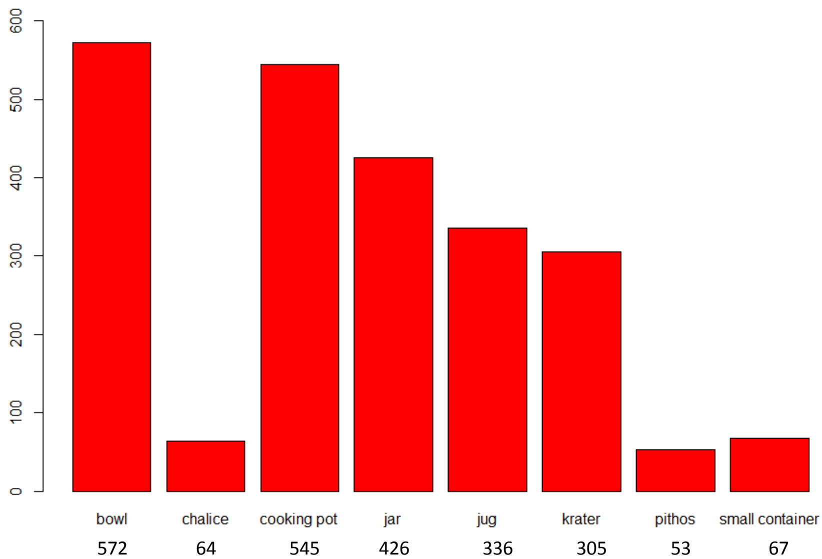


Fig. 5.182. The frequencies of the vessel classes with over 50 items. All classes were presented in Figs. 5.2–3 as a table and a pie chart and in figs 5.143–144 as tables and bar charts, with excavation areas included.

Figs. 5.181–182 present the frequencies of rim forms, directions of the rim part, and major vessel classes, which serve as the basis of the correspondence analyses graphically presented in Figs. 5.183–185, visualizing the associations between these features.

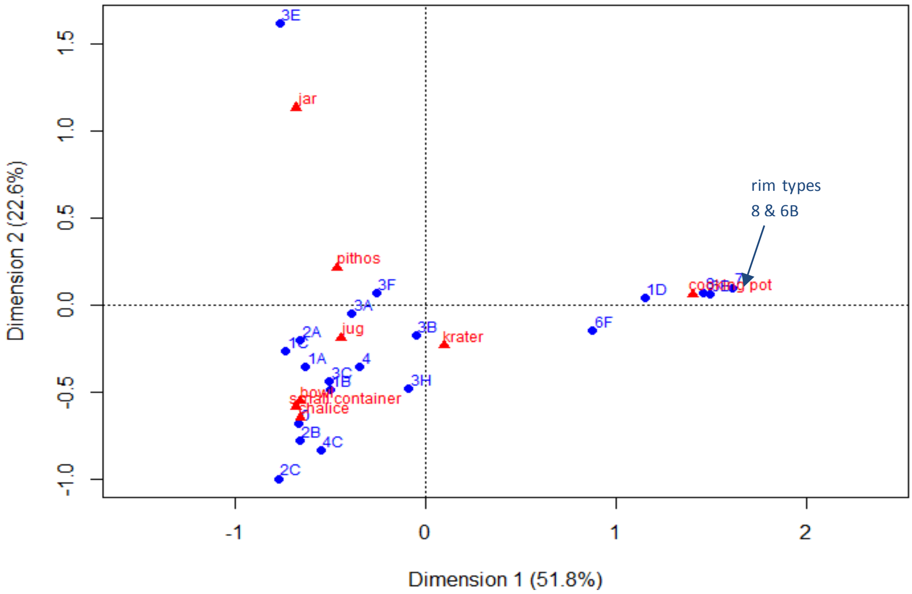


Fig. 5.183a. A symmetric CA plot of vessel class and rim type, large vessel groups only (n>50).

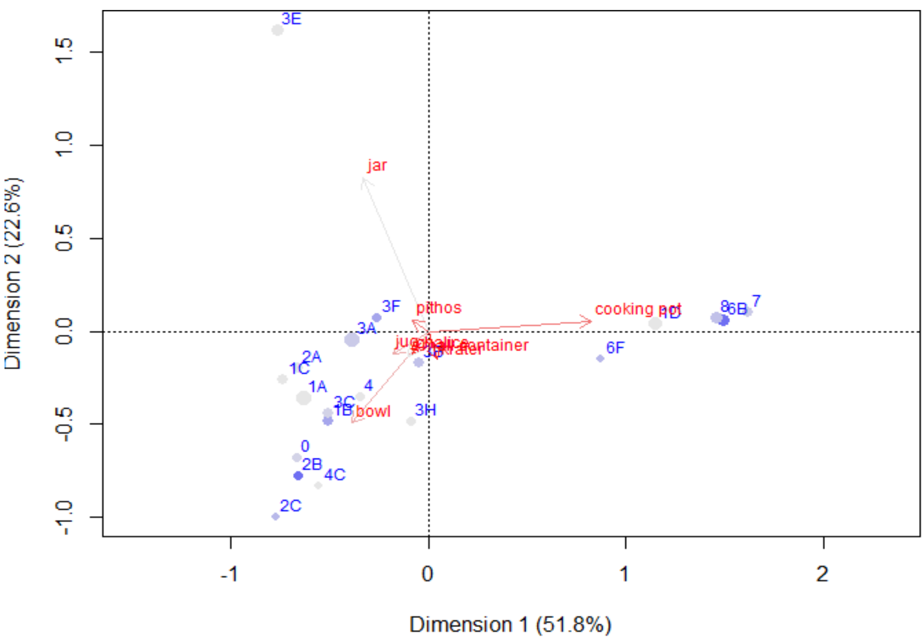


Fig. 5.183b. An asymmetric CA plot of the rim type and vessel class. Point size and strength are related to the frequency of the rim type, and the length of the arrow to the frequency of the vessel class.

Jars are dominated by one distinctive rim type (3E), while cooking pots have several distinctive rim types (1D, 6B, 6F, 7, and 8). When the same material is plotted with vessel types instead of the vessel classes (Fig. 183c), it becomes clear that some types within the jars (SJ01), cooking pots (CP01), and kraters (KR04) dominate these classes. These types are clearly distinguished by certain rim forms, while other jar types (like SJ03 and SJ05) cluster with most of the material and most of the rim forms, indicating that they share rim forms with other vessels classes, i.e. have simple or thickened rims that are common on bowls or kraters alike. Bowls appear to be associated with many rim types, as indicated by the clustering of over half of the rim forms into the lower left corner, where bowls dominate the material. In Fig. 5.183a, bowls, chalices, and small containers cluster tightly together, while cooking pots are most separated in the first dimension. Kraters are drawn towards the cooking pots, indicating that these groups share some rim types (6F and 1D, which are the less sharp rim forms), while on the other hand kraters appear close to the jugs and the cluster dominated by bowls. On Dimension 2, the jars relating to double-thickened rim (3E) separate from the other groups most clearly, and pithoi relatively clearly as well, while jugs share rim types with the cluster of bowls, chalices, and small containers. The rare vessel classes cluster at the middle of Fig. 5.183b. When vessel types are plotted against the rim forms, most of the vessel types cluster close to the origin.

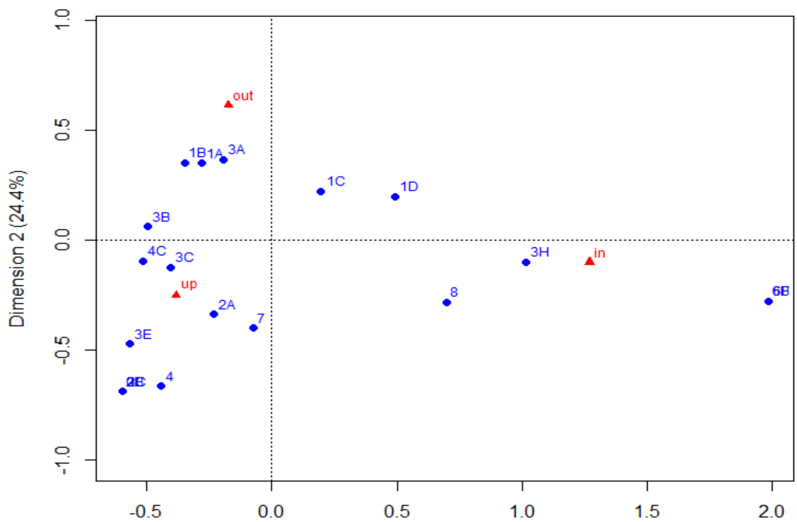


Fig. 5.184a. A symmetric CA plot of rim type (some original forms were combined) and direction of the rim part, when only largish vessel groups (n>15) are considered.

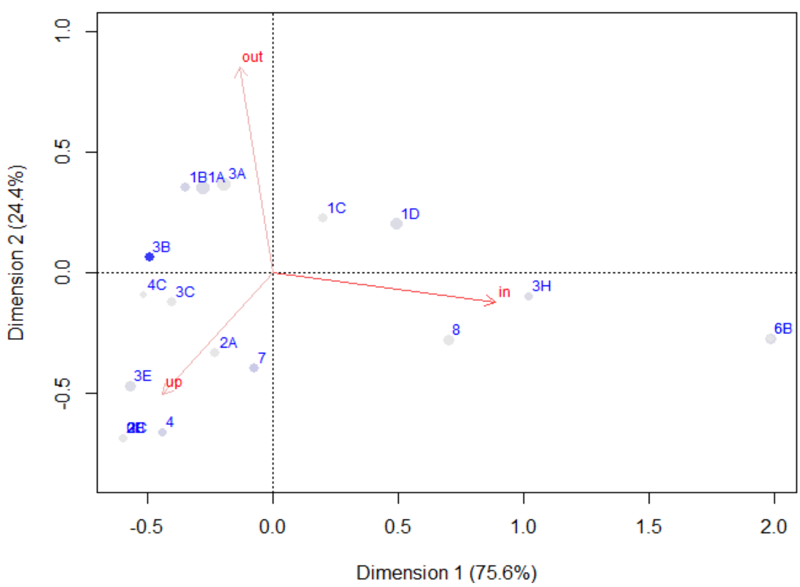


Fig. 5184b. An asymmetric CA plot of the rim type and direction of the rim part. Point size and strength are related to the frequency of the rim type and the length of the arrow to the frequency of the rim direction.

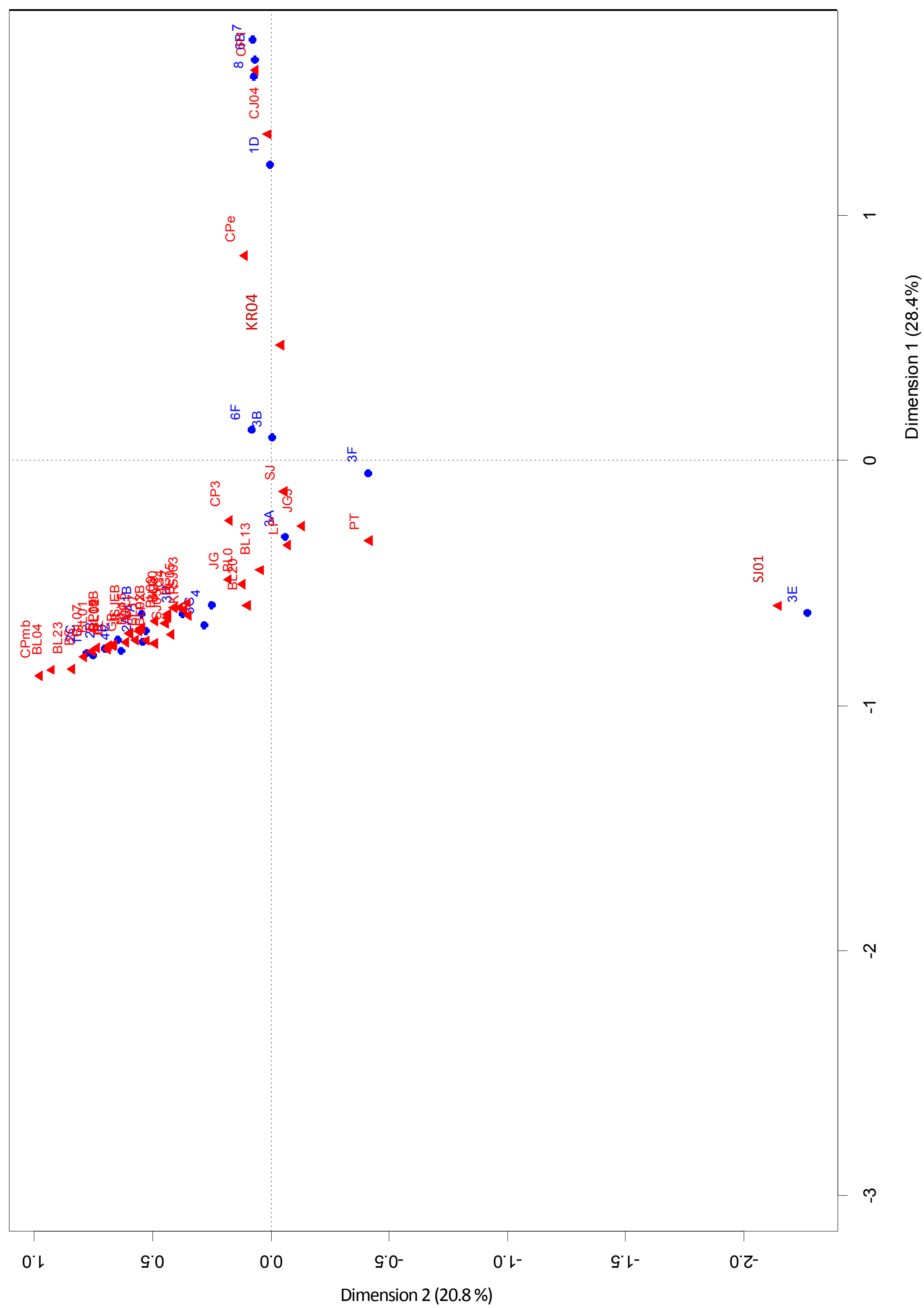


Fig. 5.183c. A symmetric Correspondence analysis plot of rim form and vessel type, when types considered earlier than Late Bronze Age II – Iron Age I transition have been combined.

In Figs. 5.184, the rim parts that are turned in separate well in the first dimension, while the rims that tend to be flaring (out) or upright, separate in dimension 2, though not as strongly. Rim types 0, 2B, and 2C cluster on each other in the lower left corner, indicating that these rim forms tend to be upright.

The direction of the rim part was defined in relation to the vessel wall below: thus, the rim part considered as bending indicates that the wall is turning inside from its profile at the body, possible neck, or shoulder (depending on the vessel form). A rim defined as bent out indicates that the rim is flaring when compared to the body (bowls and chalices), neck (closed vessels), or shoulder (cooking pots and kraters). Somewhat misleading is the designation "up" for a rim direction, as it indicates not only the upright rim parts but also such rims that do not change in their direction compared to the wall below the rim: thus, a bowl rim that continues the opening of the walls below is also considered as "up" in its direction.

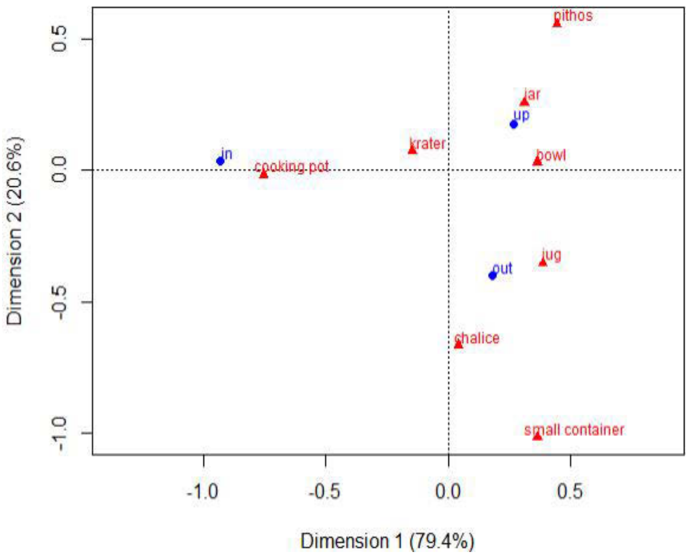


Fig. 5.185a Symmetric CA plot of direction of the rim part and vessel class.

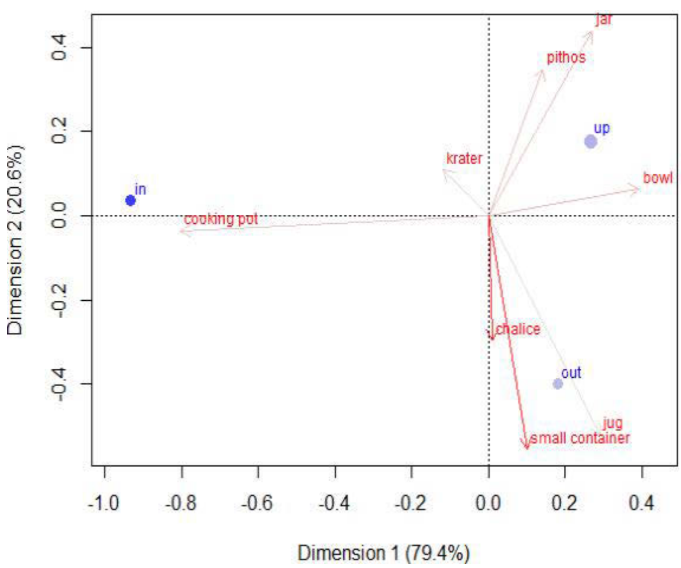


Fig. 5.185b Asymmetric CA plot of direction of the rim part and vessel class.

Figs. 5.185 show how the cooking pots tend to have inverted rims, while chalices, jugs, and small containers most commonly have flaring rim parts. Jars and pithoi mainly have upright rims, while kraters have both inverted and upright rims, indicated by their position between the directions of "in" and "up." The rim parts that were defined as upright also included rim parts that continued the direction of the wall lower in the vessel, a feature typical for bowls.

Tempering was discussed already in section 5.3.2 above, and illustrated there by tables (Figs. 5.150–152) and box-plots (Figs. 5.153). The CA plots in Figs. 5.186–187 are based on tables also including body shards that could be identified to a vessel type, and material from all periods. However, the assemblage is dominated by the material from the Iron Age. Fig. 5.186a shows the associations between the vessel classes and the identified main tempering material, and 5.186b shows those between vessel classes and the identified secondary temper.

The separated position of the cooking pots illustrates their distinctive tempering recipe, while the other vessel classes are far less separated: in Fig. 5.186a, 93 % of the variation of the main temper is included in the first dimension, upon which the cooking pots are the only group that differs from other vessels. The same phenomenon is apparent also in the secondary tempering material, where the first dimension accounts for 73% of the variability (Fig. 5.186b). The cooking pots are associated with quartz as the main temper, while the rarely observed sand and flint as main temper also appear mainly in cooking pots. The absence of a secondary temper strongly associates with cooking pots. The tendency of jugs and small containers to have red grits, dark minerals, or chalk as their main temper may reflect incidental differences. This is especially the case for the small containers, which is a relatively small group, and a few observed untypical tempering sets may therefore have a large effect on their row profiles (based on relative counts). The small containers are also separated on the second dimension in the plot, including the secondary tempering material, where red grits appear as the secondary temper mainly for them. Despite the reservations above, it is of interest that jugs and (other) small containers may have a less fixed tempering pattern than bowls and kraters used for serving and processing, or storage vessels (jars and pithoi). At the same time, chalices (also a small group) appear very close to bowls, to which they also relate as to their form.

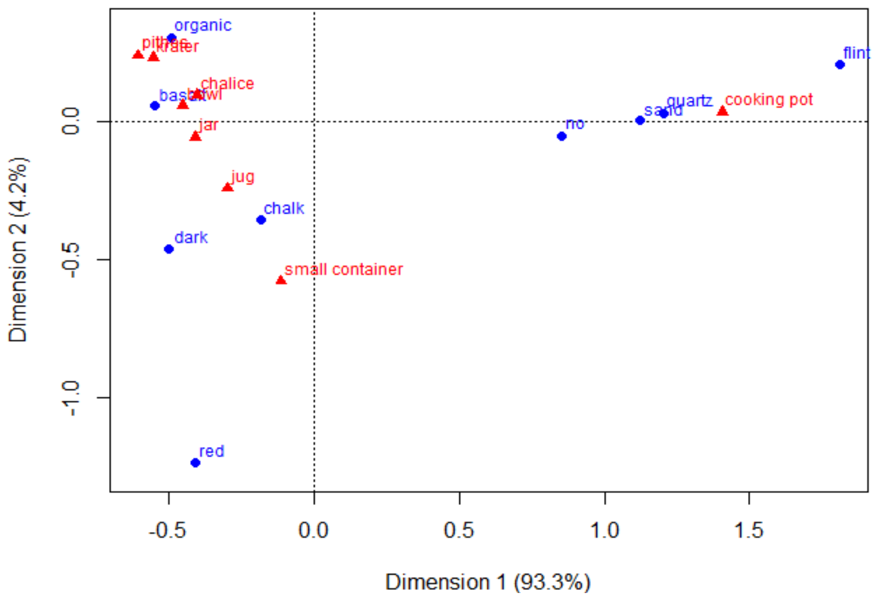


Fig. 5.186a A symmetric CA plot of the main tempering material and vessel class (large vessel groups only).

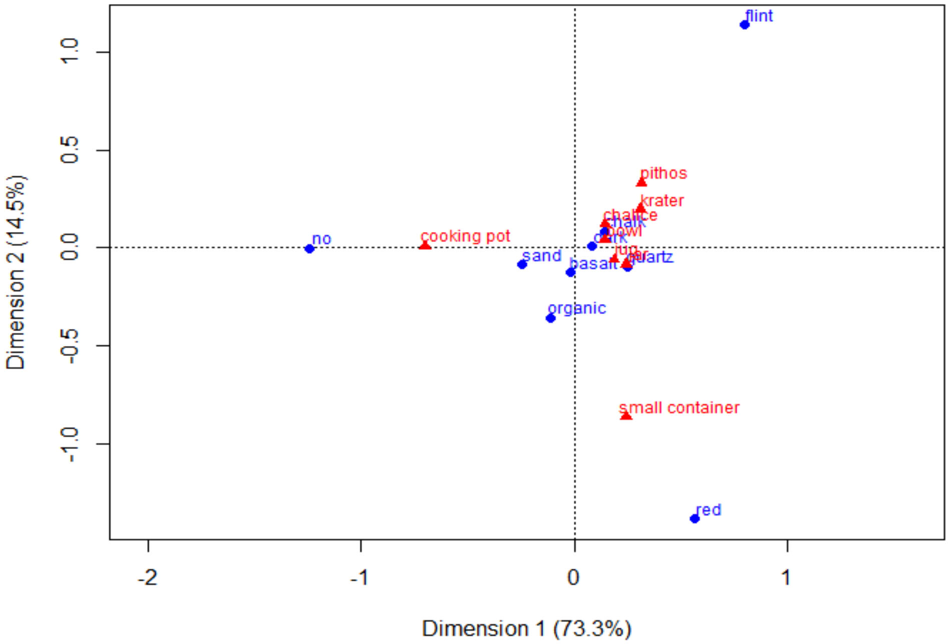


Fig. 5.186b A symmetric CA plot of the secondary tempering material and vessel class (large groups).

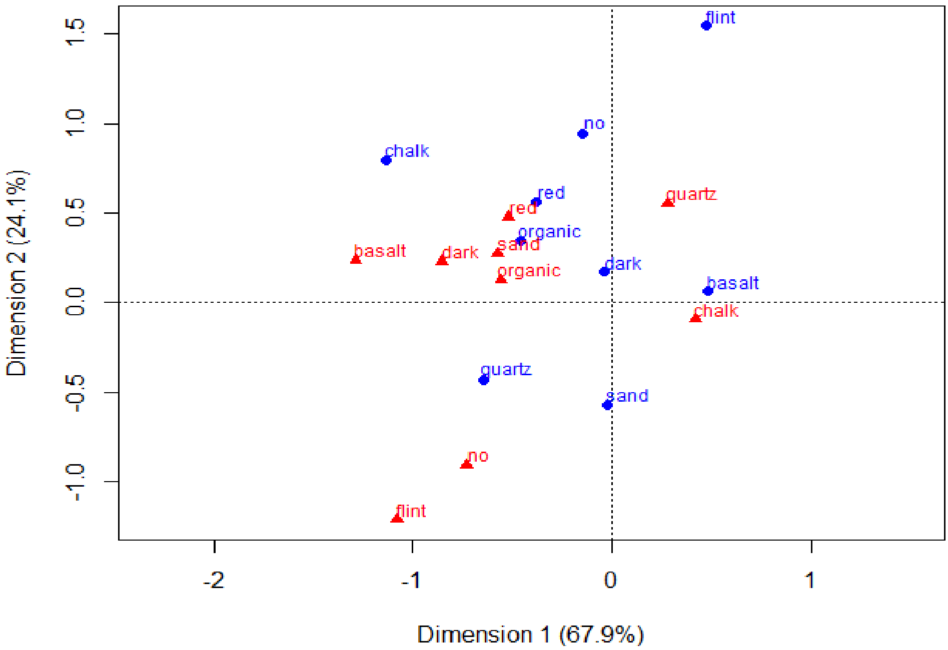


Fig. 5.187a CA plot of the main (blue dots) and secondary (red triangles) tempering materials.

When the main and secondary tempering materials are paired (Fig. 5.187), the strongest associations appear on the first dimension, accounting for 68 % of the variability in the tempering materials. Basalt and chalk appear as a tight couple, especially when basalt is the main temper. Quartz as the main temper associates with the absence of temper, while all other observed tempering materials such as chalk appear relatively close to it as well.

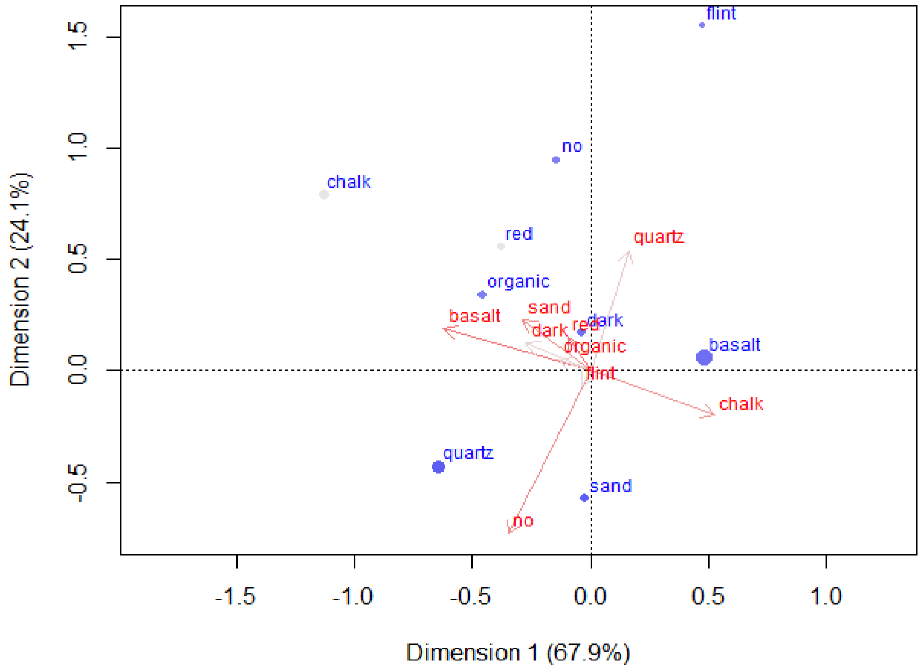


Fig. 5.187b An asymmetric CA plot of the main (blue dots) and secondary (red arrows) tempering materials. Point size and strength is related to the frequency of the main tempering material, while the arrow length is related to the frequency of the secondary tempering.

The plots of the correspondence analysis do not add to the information included in the tables in section 5.3.2. above. However, the visual presentation makes the connections more visible, providing better access to the data.

While a simple CA can only take into account two variables at the same time, the analysis can be extended to include more than two variables in multiple correspondence analysis. As in simple correspondence analysis, *multiple correspondence analysis (MCA)* is a multivariate method that allows us to analyze the systematic patterns of variation with *categorical* data. MCA applies to tables in which the observations are described by a set of categorical variables. In principle, any ordinal or continuous variable could be added to the analyses (the continuous variables as classified into groups). However, when there are five originally categorical variables (Fig. 5.188) the picture starts to be relatively complex, and therefore when too many variables are included the method loses its main advantage of bringing forward insightful connections between features.

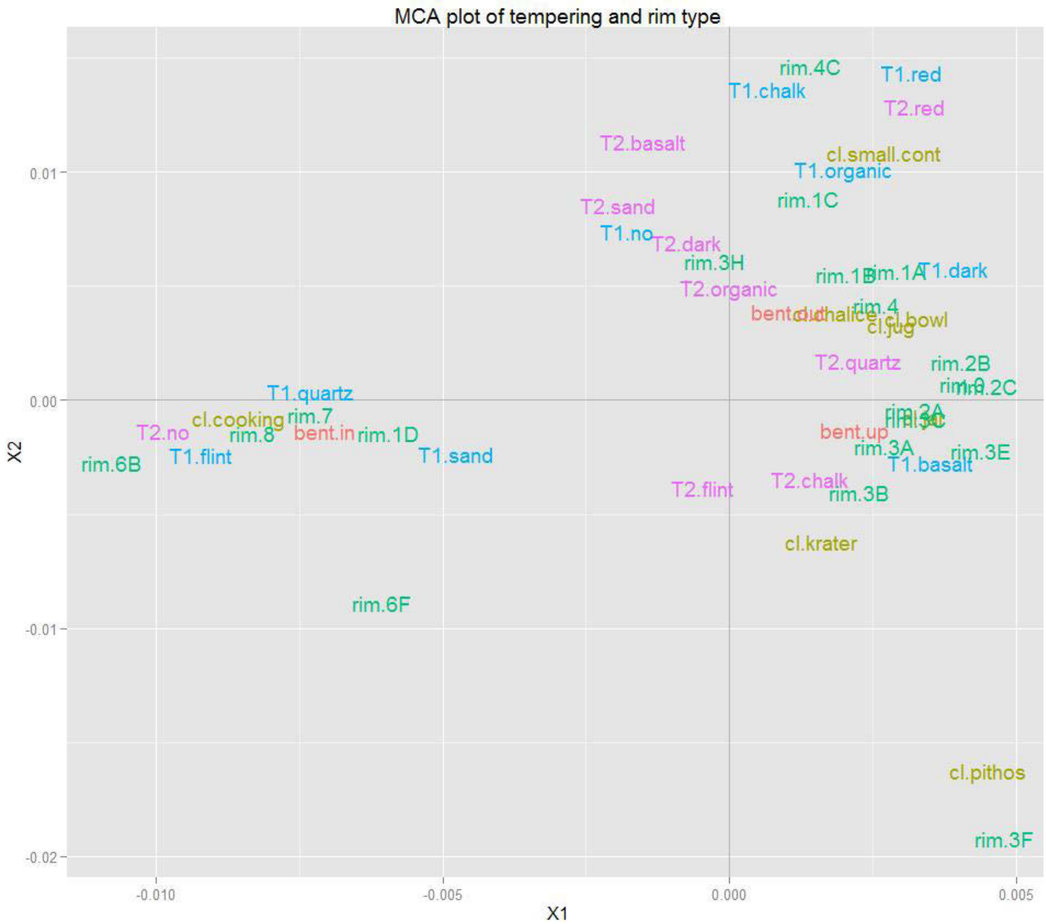


Fig. 5.188 Multiple correspondence plot of rim type in green, direction of the rim (bent) in red, vessel class (cl) in olive green, the main tempering material (T1) in blue and the secondary tempering material (T2) in pink.

Fig. 5.188 has five features included in the same graph: the main and secondary tempering materials, rim form, direction of the rim part, and the vessel class. The cooking pots separate both as regards the tempering and the rim form, while the other vessel classes can mainly be set apart from each other with the help of the rim forms.

Because the chronological interest is often a crucial part of the pottery studies, I wanted to look at possible chronological differences that might appear between the phases that were stratigraphically separated. Therefore, Fig. 5.189 also includes the stratum. Only the earliest strata differ from the rest, while strata 0 – 1 including the mixed materials from the surface layer cluster at the origin, while the Iron Age phases also cluster close to it. This indicates that the material from the main phases and that from the uppermost mixed layers do not portray strong differences as to the presence of different vessel classes, rim forms or tempering. The earliest phases (strata 5 and 6 in the figure, but actually they represent material from strata U4 and U5 respectively) separate from the rest in the second dimension (X2), while in the first dimension (X1) they also align with the rest of the material. However, these two phases have been excavated to a very limited extent only. For this reason, the material may be strongly dominated by a few items that may be incidental. Most of the material derives from the main phases of the Iron Age (U3A and U3B, and W3 and W4, labelled in Fig. 5.189 as 3 and 4 respectively), while the mixed uppermost layers (0 and 1) also provided a fair amount of shard material. These strata dominate the assemblage as a whole, and therefore set an average for the material and are located close to the origin. The mixed uppermost layers include material from all periods due to mixing and erosion, and thus become in some sense average.

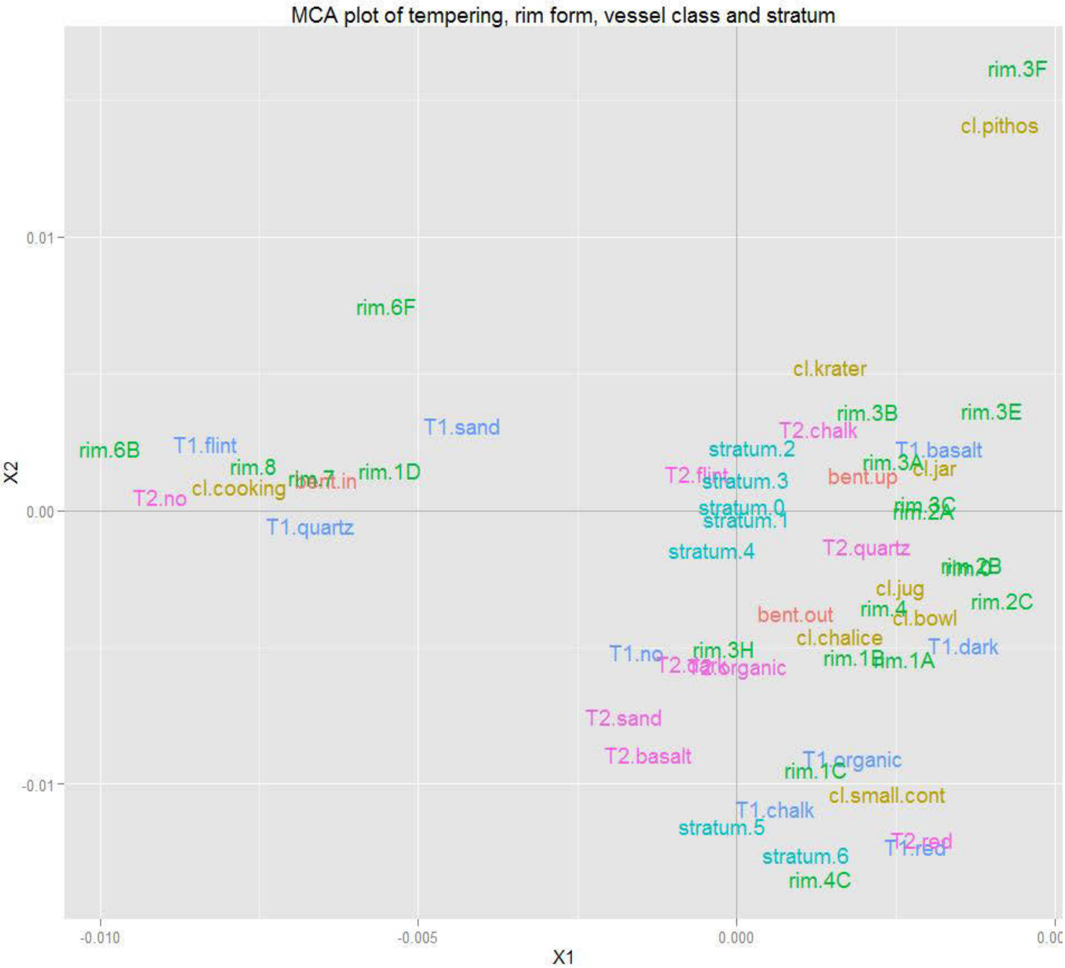


Fig. 5.189 A multiple correspondence plot with stratum, rim form, and vessel class.

The plots of the simple as well as multiple correspondence analyses provide a means to see how different features relate to each other. In principle, any continuous or ordinal variable could be classified and added to the plot. However, that would lead to loss of information. The interesting associations between different features that we have been able to observe in the CA plots and their connection to the typology can be further explored by discriminant analysis, where I will combine the use of continuous, ordinal, and categorical variables.

5.3.3.3. Grouping Material with Discriminant Analysis

As grouping is central in archaeological artifact studies, I considered it essential to try and find help from statistics in this respect. There are two widely used statistical grouping methods: clustering and discriminant analysis (DA). While the techniques of factor and correspondence analyses discussed above were tools for detecting structure across the variables, clustering and discriminant analyses aim at revealing patterning across the observations (Hair et al 1998: 473, 483–484). In their most classical forms, clustering techniques are not directly applicable to categorical variables, because the categories cannot be ordered in any meaningful way and there are no reasonable ways to give them a measure of similarity or distance (Grim 2006: 640). However, categories are commonly transformed into binary (yes/no) variables and then treated in the same way in the analyses as the numeric, continuous variables.

In Israeli pottery studies, Zweig has recently used decision (classification) trees for predicting vessel types (2012: 431, 436–450). The decision tree is a hierarchic method of segmenting the observations (Zweig 2012: 431, 436). The hierarchic procedure forces the decision to be explicit and transparent. However, when many variables are taken into consideration it becomes complex to follow. More importantly, the decision tree can only take one attribute (variable) into account at a time (Rezvan et al. 2013: 2001), therefore the hierarchic procedure has the effect that the order in which the attributes are taken into account has a decisive impact on the classification. It has also been considered a drawback of the decision trees that they do not provide results similar to those of human reasoning (Rezvan et al. 2013: 2001). As the amount of objects to group grows, the hierarchic clustering results become very complex, and it is thus not advisable to cluster large data sets (e.g. Hair et al 1998: 498; Greenacre & Primicerio 2013: 95) – such as the one of the Tel Kinrot ceramics. Hierarchic methods have the drawback that the later steps are always dependent on the previous ones, and therefore they do not necessarily find the best possible solutions (Greenacre & Primicerio 2013: 102). I preferred to use non-hierarchic methods with the fairly large data set at hand.

In *clustering* methods, the researcher searches for *unknown groups* by selected criteria, while in *discriminant* analysis there are *known groups* and the aim is to define how the groups differ from each other. Discriminant analysis is a relatively common method for example in ecology, where species are compared with each other (Ranta et al. 2005: 479–488), as well as in economics (Hair & al. 1998: 14). As my purpose is to evaluate the traditional typology with the help of statistics, discriminant analysis is the proper tool to use. Classic discriminant analysis uses linear combinations of selected variables to predict group membership. These variables should be metric, while the predicted groups are categorical. The idea in discriminant analysis is to determine whether the defined groups differ with regard to one or more variables, and then the variables that vary significantly according to the groups can be used to predict group membership of new items to be classified. An assumption of discriminant function analysis is that the variables that are used to discriminate between groups are not redundant. As part of the computations the variance matrices of the variables will be inverted, but if some variables are redundant with other variables the matrix cannot be inverted (Klecka 1980: 9; Dell 2013).

The original classifications of the material (body shards and EB-material excluded) is presented in Fig. 5.190. However, the smallest groups are problematic for two reasons: first, any statistical estimate (such as mean) is prone to be unreliable because of the too small sample size, and second, the discriminant analysis assumes that the group sizes are relatively close to each other. For these reasons, I have excluded the three smallest groups (unknown, stands, and lamps). The group of 'unknown' would have also been problematic because it includes per definition items that could not be identified. The group of 'unknown' lacks a common denominator that makes a class meaningful. Other assumptions of the method that are not fully met are normality across all of the used variables and the collinearity between the used variables. However, the method is robust against slight violations of the assumptions (Klecka 1980: 8–11, 61–63).

In order to evaluate the consistency of patterning over the selected variables for each class, and the success of the discriminant analysis, I made predictions for the class membership for each observation with the help of discriminant functions. The predicted class memberships (groupings based on other observed features that the type or class applied during registering) and the originally identified classes (the type assigned in sorting process) are cross tabulated in Figs. 5.191A and B. Such a cross table is called a *classification matrix* (Hair et al. 1998: 267). The **bolded** diagonal indicates the "correct" classifications – the cases where the predictions have resulted in the same classification as the original identifications. The "false" classifications appear off the diagonal, and they indicate the problematic overlaps between classes, at least according to the features that were included in the analyses – in this case features relating to the rim thickness, rim diameter, and ware. The *column* sums indicate the number of items originally classified, while the *row* sums indicate the predicted group size, classified according to the discriminant functions.

original class identifications (frequency)

unknown	bowl	jar	cooking	krater	jug	pithos	small c.	stand	chalice	lamp	Sum
13	517	317	531	290	256	45	37	13	24	7	2050

Fig. 5.190 Observed class frequencies of the subset that was used for discriminant analysis scatter plots.

original class identifications (frequency)

predicted\	bowl	chalice	cooking	jar	jug	krater	pithos	small.c	Sum
bowl	**355**	13	3	23	21	27	1	3	446
chalice	9	**2**	1	1	0	1	0	0	14
cooking	1	1	**456**	2	2	9	0	0	471
jar	5	0	0	**152**	17	2	2	0	178
jug	14	2	4	71	**163**	2	1	11	268
krater	55	1	6	2	0	**218**	1	0	283
pithos	0	0	0	1	0	9	**37**	0	47
small.c	6	0	1	4	19	0	0	**14**	44
Sum	445	19	471	256	222	268	42	28	1751

Fig. 5.191A Cross table of predicted and original classes. Predictions are based on linear combination of diameter, maximum thickness of the rim, thickness below the rim, direction of the rim part, rim form, tempering materials and their amount and particle size, plus presence of surface treatments. Categorical variables were converted into binary 0-1-variables. The smallest classes (stands, basins, lamps, and unknown) were excluded. Only cases with all the used variables recorded can be used, and therefore the n=1751.

predicted\	original class identifications (relative proportions, %) bowl	chalice	cooking	jar	jug	krater	pithos	small.c	Sum
bowl	**79.6**	2.9	0.7	5.2	4.7	6.1	0.2	0.7	100
chalice	64.3	**14.3**	7.1	7.1	0.0	7.1	0.0	0.0	100
cooking	0.2	0.2	**96.8**	0.4	0.4	1.9	0.0	0.0	100
jar	2.8	0.0	0.0	**85.4**	9.6	1.1	1.1	0.0	100
jug	5.2	0.7	1.5	26.5	**60.8**	0.7	0.4	4.1	100
krater	19.4	0.4	2.1	0.7	0.0	**77.0**	0.4	0.0	100
pithos	0.0	0.0	0.0	2.1	0.0	19.1	**78.7**	0.0	100
small.c	13.6	0.0	2.3	9.1	43.2	0.0	0.0	**31.8**	100

Fig. 5.191B Cross table of predicted and original classes, in percentages. Percentages indicate how large a fraction of the items classified as bowl according to the discriminant function were also identified as bowls originally – therefore counted by *rows*. The results would be slightly different if they were counted by columns (answering a question: how large a fraction of items originally identified as bowls were classified as such by the discriminant function?).

As can be quickly seen in Figs. 5.191, most of the miss-classifications appear between bowls, chalices, and kraters, and another cluster of classes that seem to overlap appears between jars, jugs, and small closed vessels. The only cases of mixing classes over open vs. closed vessel types are the nine cases of vessels originally identified as kraters, which would be classified as pithoi according to the created linear function. If open and closed vessels are analyzed separately, the picture is somewhat different. This is because the discriminant functions are formed only by the classes that are included, making the task easier: there are fewer groups that need to be separated from each other. For this reason, the “correct” classification rate is generally better – only the chalices remain poorly separable.

predicted\	original classifications bowl	chalice	cooking	krater	Sum
bowl	**369**	16	3	32	420
chalice	8	**2**	1	1	12
cooking	2	1	**463**	8	474
krater	66	0	4	**227**	297
Sum	445	19	471	268	1203

Fig. 5.192A Cross table of predicted and original classes, when only open vessel classes were included.

Open vessels included in the discriminant analysis appear in table in Fig. 5.192A, and plotted in two dimensional spaces from three different angles in Fig. 5.192B. How many items overlap between different classes can be read from the table (Fig. 5.192A), while the scatter plot (Fig. 5.192B) displays the cohesion of the classes by the tightness of their clustering. The scatterplots include slightly more material, because each scatterplot of two dimensions can be drawn when the variables used for that dimension are available, while the tables can be calculated only for items that have no missing values in any of the variables used in the analysis as a whole. As the scatterplots include over a thousand observed items, it is neither possible nor necessary to be able to read all the abbreviated labels. They serve to illustrate the cohesion or spread of each of the classes and their proximities to one another.

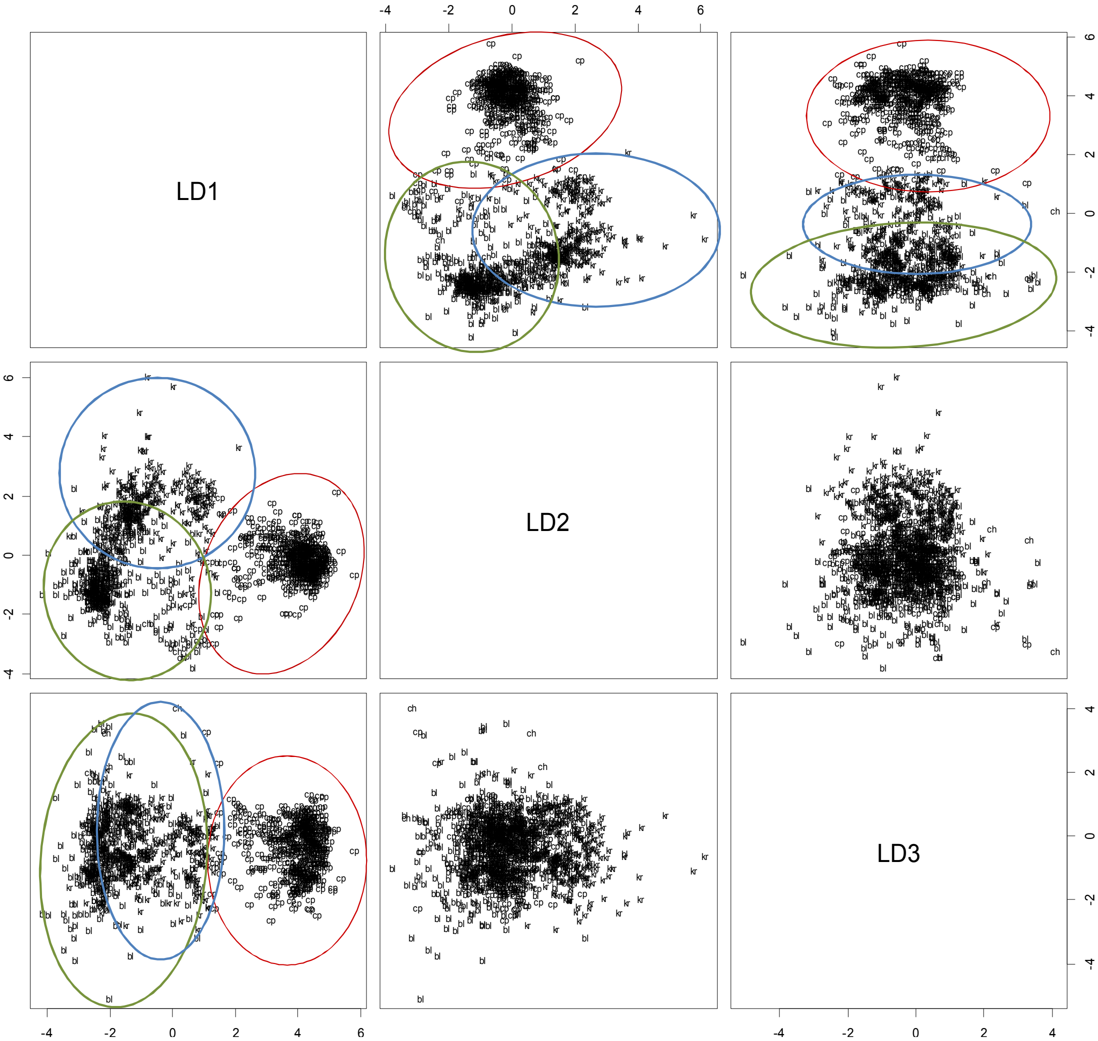


Fig. 5.192B Scatterplots of the originally identified classes against the linear discriminant functions. Only open vessel classes were included. Cooking pots separate well, especially in the first dimension (indicated by red circles), while the bowls (green circle) and kraters (blue circle) overlap and form a continuous scatter, even though they tend to differ as to their position.

The cooking pots are well separated in the first and second discriminant functions, and they appear as a tight cluster encircled with red in Fig. 5.192B. The third dimension does not add much to the separations. All the classes overlap in the third dimension, which can be seen when the first or the second discriminant function is plotted against the third one (the scatterplots of Fig. 5.192B in the lower right). In the first two discriminant functions, there is little overlap of cooking pots with bowls or kraters. Both of these groups appear much more scattered, and overlap with each other much more than with the cooking pots. However, these two large vessel classes also tend to separate from each other in the first two discriminant functions, even though the distinction is not very sharp. The chalices, then, are mostly invisible in the scatterplots, as they appear within the points dominated by bowls.

```
Closed vessels
              original classifications (frequencies)
predicted\ jar   jug Pithos small.c  Sum
  jar      204    41      3       1  249
  jug       49   169      0       7  225
  pithos     1     1     39       0   41
  small.c    2    11      0      20   33
  Sum      256   222     42      28  548
```

Fig. 5.193A Cross table of predicted and original classes, when only open vessel classes were included.

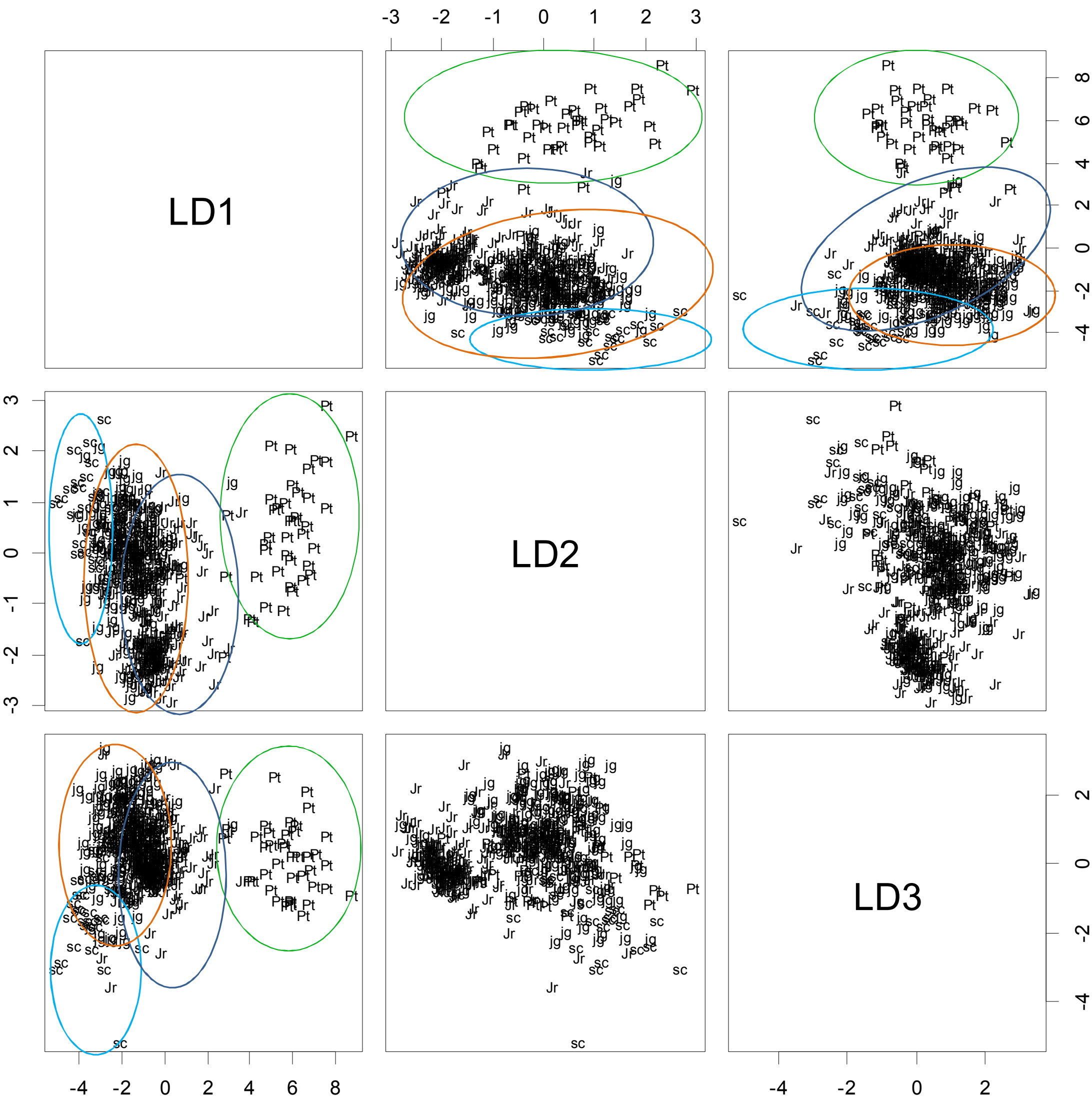


Fig. 5.193B Scatterplot of originally identified classes against the linear discriminant functions, with closed vessels. Pithoi are encircled in bright green, jars in dark blue, jugs in orange, and small containers in light blue.

In the closed vessels (Figs. 5.193), the pithoi appear as the class that is most easily separated from the rest. The overlap between jars and jugs is most severe, while there is also overlap between jugs and (other) small containers.

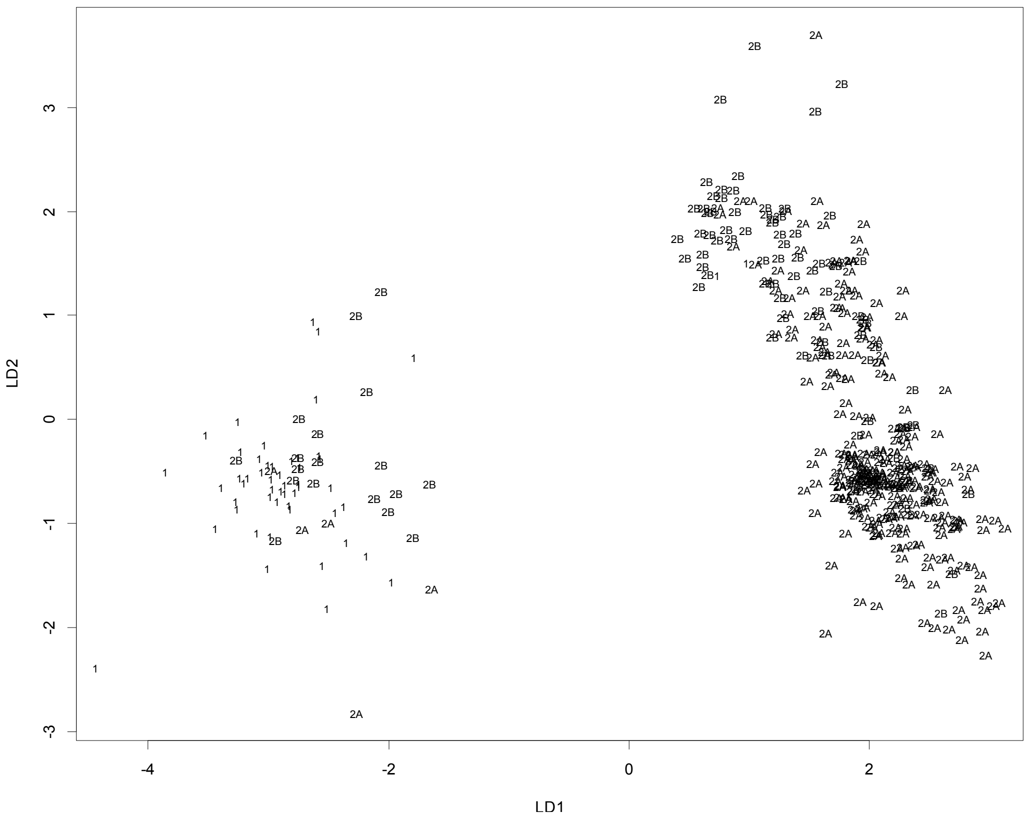
Some classes are especially prone to becoming mixed with each other: bowls and chalices on one hand and jugs and (other) small containers on the other. This is natural, as chalices are per definition footed bowls, and the analysis strongly relies on features that can be measured on the rim part and ware – features that are shared for the vessels of these two classes. It is also a good reminder of the difficulty of distinguishing chalices in the shard material. Several bowls (19 %) could also be classified as kraters. This is most likely related to the similarity of carinated kraters (KR04) and Cyma-profiled bowls (BL09), discussed in section 5.2. I considered the small containers as grouped together in the analyses, because they seemed to share several features (small size, closed form, surface treatment) and each of them would have been a class of a very small size if treated separately. Jugs are also relatively small containers, and were even arranged together with other small containers in the typology (section 5.2 above). In the statistical analyses I decided to leave jugs as a class of their own, because of the great variability within the class and the relatively large size of the group. It may be that only certain jug types are prone to becoming mixed with other small containers (e.g. the spherical decorated jugs JG04 with very narrow mouths and painted decorations). In general, the analysis indicates that some types or items within some classes might better fit another main class. This reflects the arbitrary division of some of the main classes.

In order to see how well the types within each class were distinguished from each other, I ran a discriminant analysis for the main classes separately and, in cases of overlapping classes, for the two overlapping classes combined. I start with the class for which the separation was most successful, the cooking pots.

		original type identifications (frequency)						
predicted\		CP01	CP02A	CP02B	CP03	CP04	CPmb	Sum
CP01	Triangular, everted rim	**50**	5	18	0	1	0	74
CP02A	Triangular, inverted rim	0	**267**	35	0	0	0	302
CP02B	Triangular, upright rim	2	18	**46**	2	0	0	68
CP03	Rilled, restricted rim	0	0	0	**5**	0	0	5
CP04	Cooking jug	0	1	0	0	**4**	1	6
CPmb	Rounded, everted CP	0	2	0	1	1	**13**	17
Sum		52	293	99	8	6	14	472

Fig. 5.194A Table of originally identified cooking pot types and types as predicted by the discriminant function.

As is clear in the table in Fig. 5.194A, the less numerous types can be easily separated from the three more frequent types – all of which have a triangular rim and a wide opening. The cooking pot type CP02B divides into three groups, of which one overlaps with type CP02A and another with CP01. This may be due to the flexible (and therefore unclear) definition of the rim part as “upright.” A cooking pot may have had a generally upright upper part and therefore be classified as CP02B, while the rim may have been slightly inverted or everted and recorded as such. Types 2A and 2B were already regarded in the typology as two subtypes standing in a continuum with each other regarding rim stance, which served as the main criterion between the two (see section 5.2.3). However, most cooking pots identified as type 2B cluster in the upper right corner of the plot in Fig. 5.194B.



Fig, 5.194B Three most common cooking pot types plotted according to the discriminant functions (n=497).

Jars as well as cooking pots include few types, and are therefore especially suitable for discriminant analysis. The results appear in Figs. 5.195 as tables and scatter plots.

	original type identifications (frequency)							
predicted\	SJ01A	SJ01B	SJ02A	SJ03	SJ04A	SJ10	SJX	Sum
SJ01A oval jar, ridged neck	125	0	0	1	4	2	0	132
SJ01B oval jar, simple neck	2	26	0	5	3	2	2	40
SJ02A carinated jar	0	1	7	0	0	0	0	8
SJ03 amphora	0	3	0	30	1	1	0	35
SJ04A wide necked amphora-jar	1	0	0	0	7	0	0	8
SJ10 open mouthed jar (MBII-LBI)	1	3	0	0	0	16	1	21
SJX undefined jar	1	4	0	1	0	0	5	11
Sum	130	37	7	37	15	21	8	255

Fig. 5.195A Table of originally identified jar types and types as predicted by the discriminant function (count).

	original type identifications (frequency)						
predicted\	SJ01A	SJ01B	SJ02A	SJ03	SJ04A	SJ10	Sum
SJ01A oval jar, ridged neck	**125**	0	0	1	4	2	132
SJ01B oval jar, simple neck	2	**30**	0	6	3	2	43
SJ02A carinated jar	0	1	**7**	0	0	0	8
SJ03 amphora	1	3	0	**30**	1	0	35
SJ04A wide necked amphora-jar	1	0	0	0	**7**	0	8
SJ10 open mouthed jar (MBII-LBI)	1	3	0	0	0	**17**	21
Sum	130	37	7	37	15	21	247

Fig. 5.195B Table of originally identified jar types and jar types as predicted by the discriminant function (counted items), when the group of undefined jars is excluded.

predicted\	SJ01A	SJ01B	SJ02A	SJ03	SJ04A	SJ10	Sum
	original type identifications (in percentages)						
SJ01A oval jar, ridged neck	**94.7**	0.0	0.0	0.8	3.0	1.5	100
SJ01B oval jar, simple neck	4.7	**69.8**	0.0	14.0	7.0	4.7	100
SJ02A carinated jar	0.0	12.5	**87.5**	0.0	0.0	0.0	100
SJ03 amphora	2.9	8.6	0.0	**85.7**	2.9	0.0	100
SJ04A wide necked amphora-jar	12.5	0.0	0.0	0.0	**87.5**	0.0	100
SJ10 open mouthed jar (MBII-LBI)	4.8	14.3	0.0	0.0	0.0	**81.0**	100

Fig. 5.195C Table of originally identified jar types and jar types as predicted by the discriminant function (%), when the group of undefined jars is excluded, n=247. The *row* percentages indicate how large a proportion of jars originally identified as type X were also predicted as such.

The most common jar type, the oval jar with ridged neck (SJ01A), is especially well identified by the analysis: 95 % of the items originally identified as SJ01A were correctly classified by the discriminant analysis (Fig. 5.195C), and they cluster very tightly, particularly in the first discriminant function. This type in general dominates the assemblage when the whole class is treated together. The dissimilar group sizes may present a problem, as the discriminant analysis assumes that the group sizes do not differ dramatically. In particular, the oval jar with simple rim (SJ01B) is less clearly identified, and it overlaps with several other jar types.

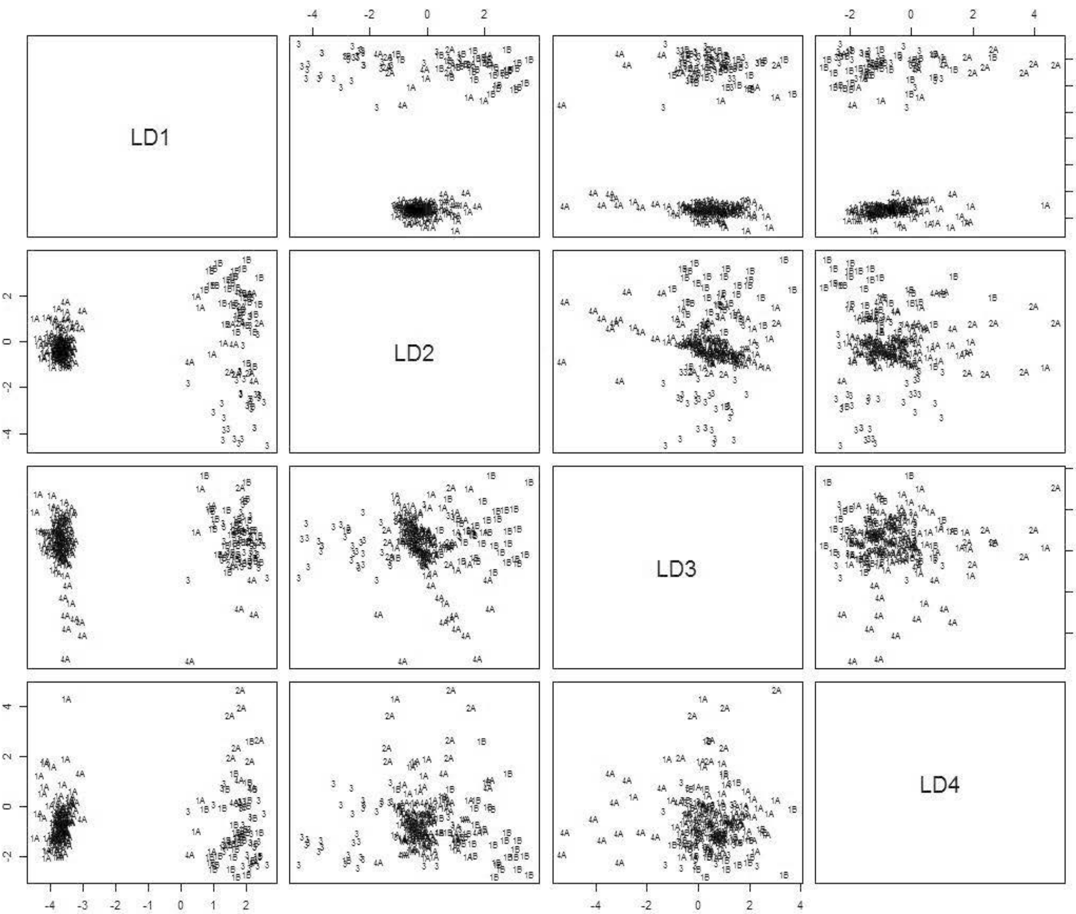


Fig. 5.195D. Jar types plotted according to the discriminant functions. Undefined jars and the earlier jar type SJ10 have been excluded, and the figure includes only types considered as Iron Age I types.

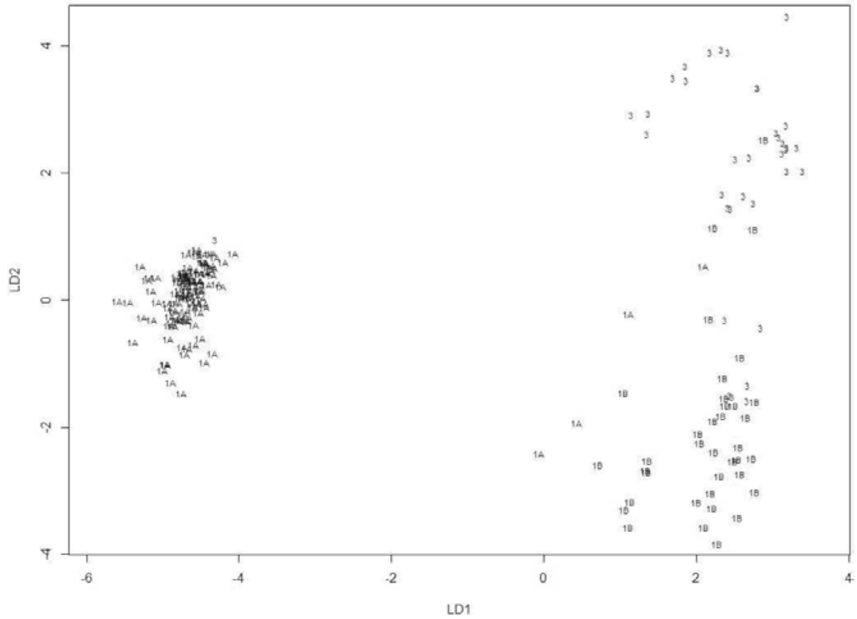


Fig. 5.195E Scatter plots of the three most common jar types according to the discriminant functions.

The predicted classes and originally defined jar types (Figs. 5.195A and B) are much more in line with each other than were the classes in Fig. 5.191. This is because some of the classes – as they are broadly defined upper categories – include much variation within the class. Especially in small sized groups, even one exceptional item (also called an outlier) may have dramatic consequences for any counted statistics, also distorting the calculation of the discriminant functions. This may be the reason for the lower rate of correct classifications in the smaller jar types as opposed to the oval jar with ridged neck (SJ01A). However, all jar types were relatively well identified by the discriminant analysis. Even the least successfully identified oval jars with simple rim (SJ01B) were correctly identified in 70 % of the cases. While the first discriminant function separates most clearly the oval jars with ridged rims (SJ01A, see the uppermost row and the left column in Fig. 5.195D and Fig. 5.195E), the second function (on the second row and column in Fig. 5.195D) distinguishes well the oval jars with simple rim and the amphorae (SJ01B and SJ3), and the third discriminant function (on the third row and column in Fig. 5.195D) separates the wide necked amphora-jars (SJ04A).

While the overlap in vessel classes between jars and jugs was significant, the overlap between jugs and (other) small containers was even higher. Therefore, I decided to examine all small containers together. This is also reasonable because their functions may overlap as well. When analyzing jugs and other small containers we face the problem of too small group sizes: there are several jug types with only one, two, or three items identified. There were five such types in the sub assemblage of small containers, as appears in Fig. 5.196B. These groups, together with the problematic but large group of undefined jugs, were excluded from the analysis, which makes the sub assemblage used relatively small. The small containers are heavily dominated by the only really frequent jug type (Jg 03A), which was already in the typology (section 5.2.5) described as an incoherent group. Therefore, it is not surprising to see that it overlaps considerably with the group of undefined jugs (jgx).

original type identifications (frequency)

fl	gb	jg1	jg2c	jg3a	jg3b	jg4	jg5	jg7	jgx	jl	px	Sum
11	4	9	2	97	10	5	3	1	121	9	11	283

Fig. 5.196A Table of originally identified small container classes and jug types.

original type identifications (frequency)

predicted \	fl	gb	jg1	jg2c	jg3a	jg3b	jg4	jg5	jg7	jgx	jgl	px	Sum
flasks	**4**	0	0	0	0	0	0	0	0	1	0	0	5
goblets	0	**2**	0	0	1	0	0	0	0	1	0	0	4
jug 01	0	0	**5**	0	1	0	0	0	0	1	0	0	7
jug 02c	1	0	0	**1**	0	0	0	0	0	2	0	0	4
jug 03a	1	0	0	0	**64**	1	0	0	0	27	0	0	93
jug 03b	0	0	0	0	0	**3**	0	0	0	2	0	0	5
jug 04	0	0	0	0	0	0	**3**	0	0	0	0	1	4
jug 05	0	0	0	0	0	0	0	**1**	0	0	0	0	1
jug 07	0	0	0	0	0	0	0	0	**1**	0	0	0	1
jug x	1	1	2	1	27	6	0	0	0	**63**	0	0	101
juglets	0	0	0	0	1	0	0	0	0	0	**8**	0	9
pyxides	2	0	0	0	0	0	0	0	0	1	0	**7**	10
Sum	9	3	7	2	94	10	3	1	1	98	8	8	244

Fig. 5.196B Table of originally identified small container types and the types as predicted by the discriminant function (in counts). The types of the rare classes (flasks, goblets, juglets, and pyxides) were treated as one type. Only cases without missing values in the used variables can be used for predictions, therefore n=244.

original type identifications (frequency)

predicted\	fl	jg1	jg3a	jg3b	jl	px	Sum
flask	**5**	0	0	0	0	0	5
jug01	0	**6**	1	0	0	0	7
jug03a	2	1	**92**	4	1	0	100
jug03b	0	0	0	**6**	0	0	6
juglet	0	0	1	0	**7**	0	8
pyxis	2	0	0	0	0	**8**	10
Sum	9	7	94	10	8	8	136

Fig. 5.196C Table of originally identified small container types and the types as predicted by the discriminant function (counts), when only groups with at least 7 items (of original classifications) were included, n=136.

original type identifications (percentages)

predicted\	fl	jg1	jg3a	jg3b	jl	px	Sum
flask	**100.0**	0.0	0.0	0.0	0.0	0.0	100
jug01	0.0	**85.7**	14.3	0.0	0.0	0.0	100
jug03a	0.02	0.01	**92.0**	0.04	0.01	0.0	100
jug03b	0.0	0.0	0.0	**100.0**	0.0	0.0	100
juglet	0.0	0.0	12.5	0.0	8**7.5**	0.0	100
pyxis	20.0	0.0	0.0	0.0	0.0	**80.0**	100

Fig. 5.196D Table of originally identified small container types and the types predicted by the discriminant function (row percentages), when groups with at least 7 items (of original classifications) are included, n=136.

When I excluded the extremely rare types of small containers (1–3 items) from the analyses, the discriminant analyses succeeded well in identifying the original types. The most severe overlap occurs between pyxides and flasks, where all eight originally identified pyxides where correctly classified, but in addition two flasks were classified as pyxides. Over 85 % of the classifications by the discriminant functions in other small containers agree with the original identifications. The flasks were easy to identify because the wheel marks and painted decorations run in another direction as in all other vessels. However, this distinctive feature was not included in the variables that I observed from the vessels, and it would have been relevant only for identifying flasks and irrelevant for any other distinctions.

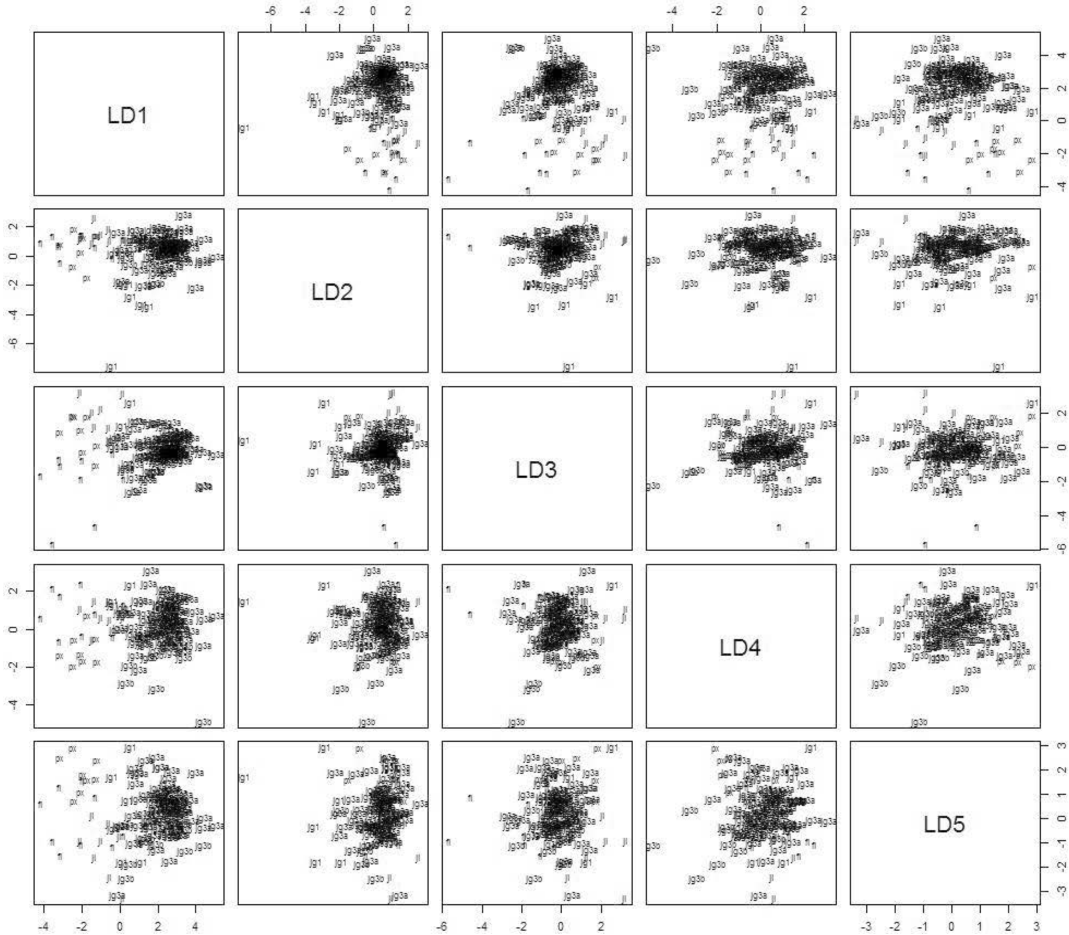


Fig. 5.196E jugs and other small containers, when the undefined jugs and smallest groups are excluded, n=136.

When the small containers included in the table in Fig. 5.195C are plotted according to the formed discriminant functions, the graph in Fig. 5.196E is heavily dominated by the jug type JG03A, rounded jugs with tall and wide neck – a type that is identified 94 times in the sub set of 136 items, thus comprising 69 % of the observations. Nevertheless, one can distinguish most of the flasks, (fl), juglets (Jl), pyxides (px), and the small and narrow necked oval jug (Jg1) separating from the main cluster of observations, while most rounded jugs with short and wide necks (type JG03B) are covered by the rounded jugs with tall and wide neck (JG03A). This is, however, not surprising, as the types were already in the typology considered as two subtypes of rounded jugs. If the dominant jug type JG03A is excluded from the analyses, all the remaining small containers are easily separated from each other, although the pyxides and flasks do portray some overlap in all discriminant functions (Fig. 5.196F).

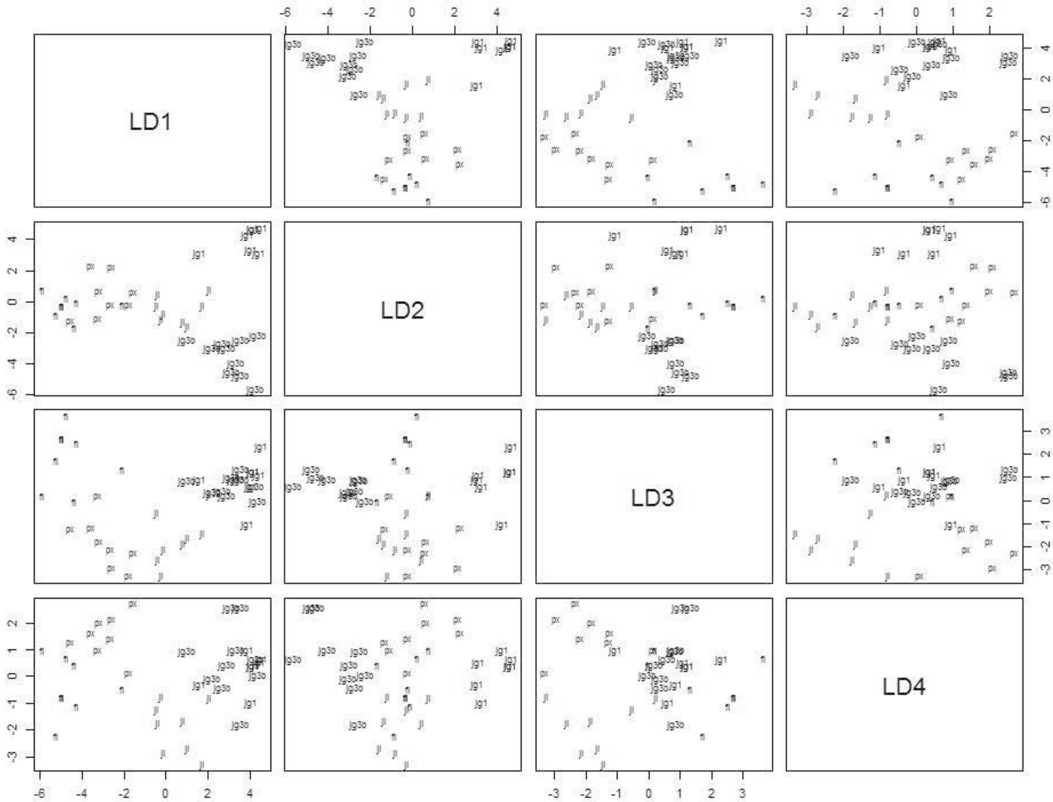


Fig. 5.196F jugs and other small closed vessels, when the dominating type jug 3A is excluded, n=50.

In order to have a closer look at the overlapping classes of bowls and kraters, these two main classes need to be analyzed together.

Originally identified types

BL0	BL01	BL02A	BL02B	BL02C	BL03	BL04	BL06	BL07	BL08	BL09	KR0	KR01	KR03A	KR03B	KR04	KR05	KR06	Sum
151	74	130	16	10	2	8	20	30	5	49	5	25	20	31	194	11	2	783

Fig. 5.197A Table of originally identified bowl and krater types (subtypes combined and EB material excluded).

There are 18 bowl and krater types (Fig. 5.197A), which makes cross-tables as well as graphics difficult to grasp. Because the groups of “undefined” (BL0 and KR0) are by definition not types that would have been defined by some common characteristics, it is reasonable to leave them out of the analysis. I also decided to leave out two small bowl types that are probably residual from the Middle or Late Bronze Ages: the fine ware bowls (BL03) and inverted cup-bowls (BL08), leaving 14 types in the analysis (Fig. 5.197B). At the same time, I decided to keep two types that may at least partially represent residual material: the wide and shallow bowls (BL01) and everted kraters (KR01). These two types are fairly large, and even though the form already appears during the (Middle and) Late Bronze Age, such forms seem to continue into the Iron Age. Therefore, it seems unlikely that the items identified of these two types should be considered only residual.

Originally identified types														
BL01	BL02A	BL02B	BL02C	BL04	BL06	BL07	BL09	KR01	KR03A	KR03B	KR04	KR05	KR06	Sum
74	130	16	10	8	20	30	49	25	20	31	194	11	2	620

Fig. 5.197B Table of originally identified bowl and krater types, when excluding the undefined and probably residual MB–LB material (in addition to the EB material).

	Originally identified types														
Predicted\	BL01	BL02A	BL02B	BL02C	BL04	BL06	BL07	BL09	KR01	KR03A	KR03B	KR04	KR05	KR06	Sum
BL01	**51**	0	1	0	0	1	1	2	1	1	2	0	0	0	60
BL02A	8	**108**	1	1	1	4	8	0	0	0	1	1	0	0	133
BL02B	1	1	**10**	1	1	0	1	0	2	2	4	1	0	0	24
BL02C	0	0	0	**3**	1	2	0	0	0	0	0	0	0	0	6
BL04	1	2	0	0	**1**	0	0	0	0	0	1	0	0	0	5
BL06	3	4	0	3	0	**11**	0	2	0	0	1	0	1	0	25
BL07	0	3	0	0	1	0	**7**	1	0	0	0	1	0	0	13
BL09	1	0	0	1	0	2	2	**36**	1	1	5	6	3	0	58
KR01	1	1	0	0	0	0	0	2	**13**	1	1	0	1	0	20
KR03A	0	0	1	0	0	0	0	0	2	**11**	3	1	0	0	18
KR03B	0	0	0	0	0	0	1	0	0	1	**6**	0	0	0	8
KR04	2	3	0	0	1	0	4	3	0	3	6	**171**	0	0	193
KR05	0	2	1	1	0	0	0	0	0	0	0	0	**6**	0	10
KR06	0	0	0	0	0	0	0	0	1	0	0	0	0	**1**	2
Sum	68	124	14	10	6	20	24	46	20	20	30	181	11	1	575

Fig. 5.197C Table of originally identified bowl and krater types, and the types as predicted by the discriminant function (in counts).

	Originally identified types									
Predicted\	BL01	BL02A	BL06	BL07	BL09	KR01	KR03A	KR03B	KR04	Sum
BL01	**53**	1	1	1	2	1	1	2	0	62
BL02A	8	**110**	5	9	1	0	0	1	1	135
BL06	3	4	**12**	0	1	0	0	1	0	21
BL07	0	3	0	**6**	1	0	0	0	1	11
BL09	1	0	2	2	**36**	1	1	5	6	54
KR01	0	1	0	0	2	**15**	1	1	0	20
KR03A	0	0	0	1	0	3	**13**	5	2	24
KR03B	1	2	0	1	0	0	1	**9**	0	14
KR04	2	3	0	4	3	0	3	6	**171**	192
Sum	68	124	20	24	46	20	20	30	181	533

Fig. 5.197D Table of originally identified bowl and krater types, and the types as predicted by the discriminant function (in counts), when rare types (n<20) were excluded.

Most misclassifications within the bowls and kraters appear between the first four bowl types (BL01, 02A, 06 and 07) on one hand, and between kraters and the relatively wide cyma bowl (BL09) on the other. As the graphics are most readable with only a few groups in the same plot, I decided to create separate graphs for these two groups. I also decided to combine the inverted kraters KR03A and KR03B into a combined group. An analysis run according to these smaller sub sets of data has a better chance of success, due to making the task easier by reducing groups to discriminate (see Figs. 5.197E and F).

	original class				
pred.	BL1	BL2A	BL6	BL7	Sum
BL1	**61**	1	1	2	65
BL2A	4	**118**	3	9	134
BL6	2	2	**16**	0	20
BL7	1	3	0	**13**	17
Sum	68	124	20	24	236

Fig. 5.197E Table of shallow bowls BL01 and small bowls as originally identified and as predicted by the analysis

	original class				
pred.	BL9	KR1	KR3	KR4	Sum
BL9	**41**	2	7	5	55
KR1	0	**13**	3	0	16
KR3	1	5	**30**	3	39
KR4	4	0	10	**173**	187
Sum	46	20	50	181	297

Fig. 5.197F Table of bowl type BL09 and kraters as originally identified and as predicted by the analysis

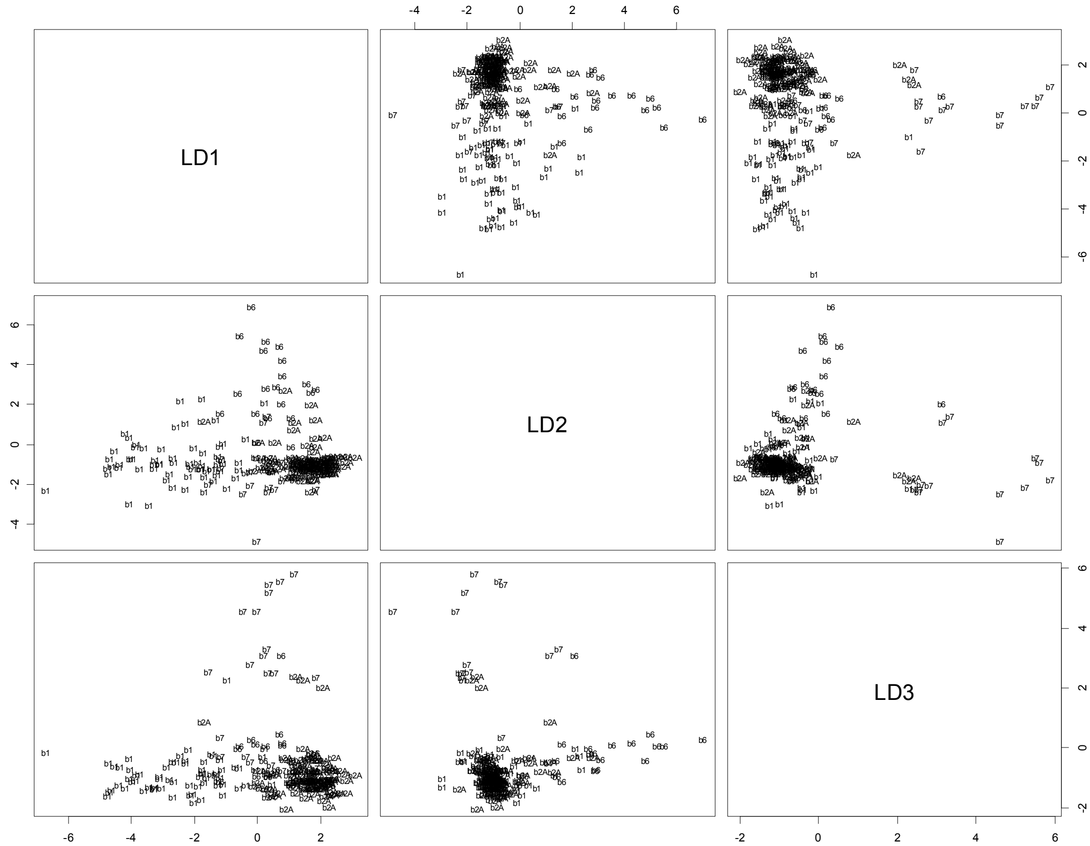


Fig. 5.197G. Small bowl types of Fig 5.197E plotted according to the discriminant functions.

The small bowls plotted according to the three discriminant functions (Fig. 5.197G) show the more common groups of wide and shallow bowls (BL01) and small, rounded bowls (BL02A) more clustered than the relatively rare bowl types of carinated bowls (BL06) and biconical bowls (BL07), which are displayed as more dispersed, indicating that they are less homogeneous types. These types are more often misclassified; the biconical bowls (BL07) in particular are often classified as small rounded bowls (BL02A). The original identification of the biconical and carinated bowls relies on features of the wall profile, which is a problematic definition in the shard material, and, for the discriminant analysis that was based on features of ware, size and rim.

In the sub-set of kraters and cyma-profiled bowls (BL09), the common groups of BL09 and carinated kraters (KR04) are better identified than the smaller groups of kraters KR01 and KR03, which overlap each other, and the inverted kraters (KR03) are also misclassified as carinated kraters (KR04). The cyma-profiled bowls (BL09) and carinated kraters (KR04) are always placed closed to each other, indicating proximity between these two types, as also discussed in the typology (section 5.2.2–3). It seems likely that the carinated krater should indeed be grouped in the same upper class with the cyma-profiled bowls as large bowls, for the smallest cyma-bowls are clearly smaller than any of the kraters.

Discriminant analysis allows one to assess how well the types differ from each other, and which types are close to each other. This may indeed be helpful when one is considering whether the subtypes appear meaningful. The analysis is restricted by the usefullness of the used variables – as are all statistical methods. Similarly, the traditional typological approach is restricted by the features considered important.

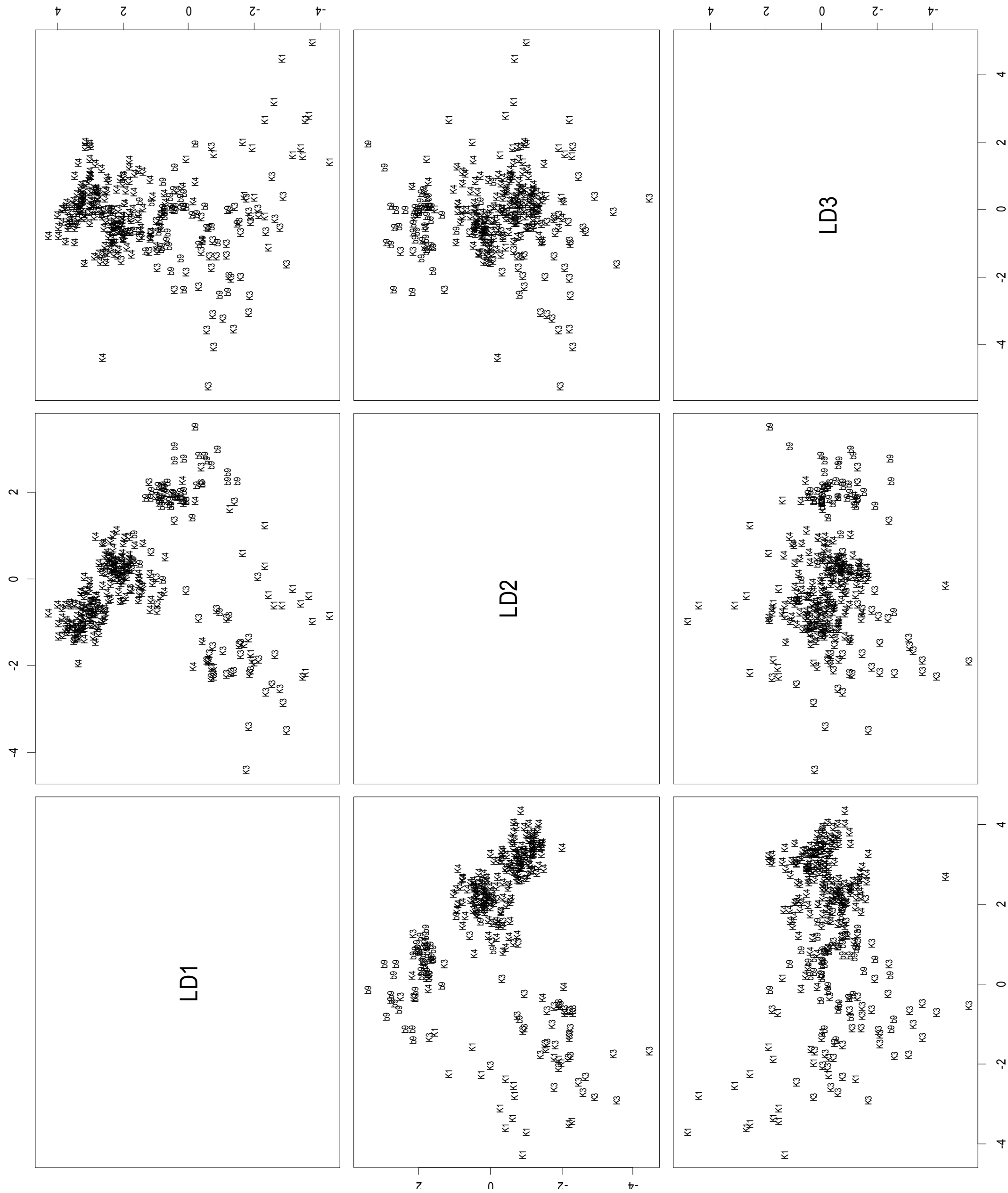


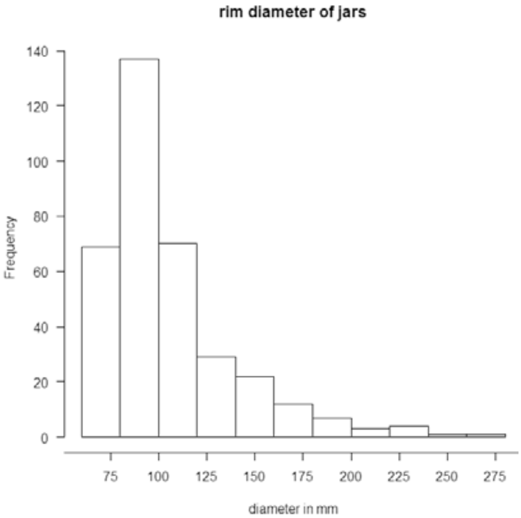
Fig. 5.197H, Large cyma bowl BL09 and krater types of Fig 5.197F plotted according to the discriminant functions.

5.3.3.4 Statistical Testing of Difference

All the previous statistical analyses have been descriptive and heuristic in nature, even though they do give counts and accuracy for the descriptions, and the stability of the patterns can be evaluated. In this section, I will leap into the confirmatory side of statistics. This means answering a yes/no question of an observed difference and its statistical significance. We can, for example, test if there is a difference between the materials from different stratigraphic phases in their size related variable of diameter (measured at the rim). Cooking pots and jars are typologically the most homogeneous vessel classes of the commonly occurring groups, providing enough observations for statistical analyses. These two vessel classes are here considered in more detail (Figs. 5.198–203). Although bowls would have been the most common vessel class, I did not consider them here, as the class is rather heterogeneous, including many types.

The diameter of the rim is used as an indicator of size. This is probably the case at least for cooking pots, which are shallow and show little variation in body shape during the Early Iron Age. Later, during Iron Age II, there are cooking pots with a closed profile, the cooking jugs become more common. The cooking pots are a well-defined group that has a specific ware with quartz inclusions and few identifiable rim forms. The overall shape is shallow and rounded, with a pronounced shoulder near the rim part (Fig. 5.204). The cooking pots are often friable due to their use with repeated heating, and their color is generally more dark and red than the other vessels, which are usually yellowish, buff, or orange in color. In the case of jars, the picture is somewhat less clear, as there are different jar types that differ not only in size but also in body form, including the neck and rim part (see Figs. 5.202–203). In general, the types with wider mouths tend to be larger in over-all size. In both jars and cooking pots the diameter of the rim part reflects the size, but the direction of the rim part should also be taken into account: open rim forms will create larger diameters than rim forms that are upright or turned inside. During the Late Bronze Age, both jars and cooking pots commonly had flaring rim parts, while during the Early Iron Age the most common rim form of jars was upright, while the rim parts of cooking pots were either upright or inverted. Thus, wider diameters might also reflect earlier, more open rim forms.

The stratigraphy of the relevant excavation areas (U and W) can be summarized briefly: stratum 0 includes material found on the surface and in mixed humus-rich topsoil. Stratum 1 includes few structures, with almost the only examples being two massive terrace walls with associated earth features, which can only be roughly dated to the post-Iron Age I habitation as they cut earlier structures. Strata 2–4 all date to the Early Iron Age, and present domestic architecture with associated floor accumulations, and in the case of stratum 4 in area U also a clear destruction layer with considerable amounts of restorable ceramics. Stratum 5 is present only in area U, and it has only been excavated to a limited extent, but it already seems to date to the Early Iron Age. Stratum 6 includes only a few pits in bedrock excavated in area U, below Iron Age structures that mainly contained Early Bronze Age material, though some later shards were collected from the upper part of the largest pit.



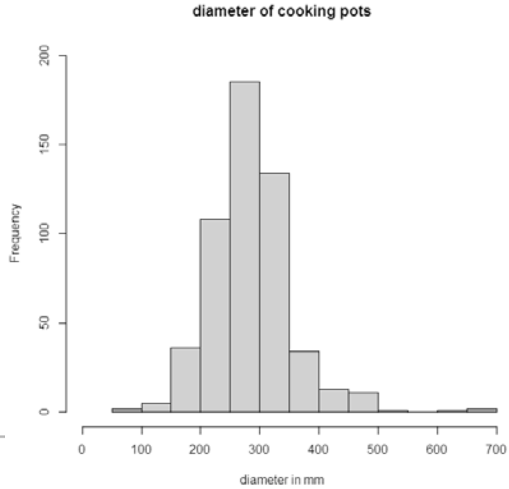
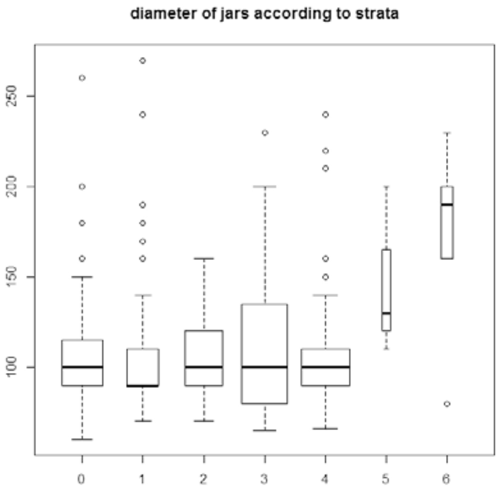


Fig. 5.198 Histogram of the rim diameter of jars

Fig. 5.199 Histogram of the rim diameter of cooking pots



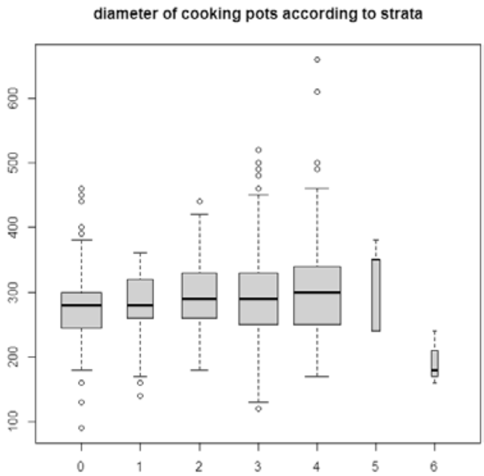


Fig. 5.200 Box-plot of the jar rim diameter according to strata

Fig. 5.201 Box-plot of the cooking pot rim diameter according to strata

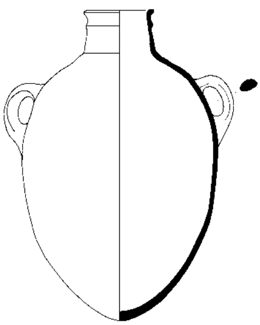


Fig. 5.202 jar 8487/1, not in scale

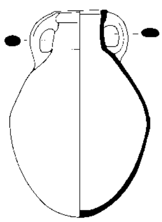


Fig. 5.203 Jar 7430/1, not in scale

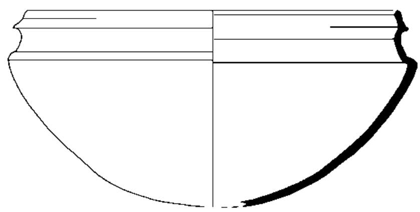


Fig. 5.204 Cooking pot 6477/4, not in scale

It is clear from Figs. 5.200 and 5.201 that the diameters of the material from strata 0–4 are very similar for both selected vessel classes. As the scanty material from the early pit in Area U is definitely much earlier, its difference with the later materials is uninteresting. An interesting difference seems to be that found between stratum 5 (which is really stratum U4, as the sub-phases U3A and U3B had to be coded as strata 3 and 4 respectively) and the rest of the Iron Age strata 4–2. The latest strata 0 and 1 were also heavily dominated by Early Iron Age material, though these contexts also include chronologically mixed material.

Is the rim diameter of jars in stratum 5 significantly larger than the rim diameter of jars in strata 2–4? The graph in Fig. 5.200 suggests that this is the case, but the small amount of jar fragments from stratum 5 may present a problem. As the distribution is skewed, I have chosen to run a Mann-Whitney test. Here we compare only the material from stratum 4 and 5, as they are chronologically closest to each other.

```
Wilcoxon rank sum test with continuity correction
data:  diam5 and diam4
W = 243, p-value = 0.02373
alternative hypothesis: true location shift is greater than 0
```

As the p-value is clearly below the traditional 0.05 we can safely consider the difference between the rim diameters of jars from stratum 5 and 4 as real. However, it may reflect the vessel form rather than the actual size. In any case, the difference is real and reflects chronological changes.

How about the cooking pots? Is the rim diameter of cooking pots in stratum 5 significantly larger than the rim diameter of cooking pots in strata 2–4? The graph in Fig. 5.19 suggests that the means might be different, but the distributions overlap and the small amount of items from stratum 5 needs to be remembered. The distribution in strata 2–4 seems rather normal, but in stratum 5 it is skewed, so I again chose to run a Mann-Whitney test.

```
Wilcoxon rank sum test with continuity correction
data:  diam5b and diam4b
W = 459, p-value = 0.3073
alternative hypothesis: true location shift is greater than 0
```

The result of the test is in line with the assessment based on the graphic. The p-value is high, and there is thus no significant difference between the vessels from strata 5 and 4 in the case of the cooking pots.

It is also of interest to see whether the distributions of vessel types over chronological phases remain constant, or whether it changes over time because of changes in space use, or if the excavated areas differ from each other. In order to gain insight into these questions, a cross-tabulation and χ^2-test was carried out. The body shards were excluded from the analyses, as their amount directly increases the amount of the items in the class "unknown," but this is due to the fact that all identified Early Bronze Age shards were kept, even though the vessel type often remained unknown. These shards were more common in the lower layers. The smallest vessel classes were left out from the analyses. Still, there are cells with less than 5 observations, and the prerequisites of the test are not well met. The problem was tackled by randomizing the material by a factor of 1000.

Data observed (body shards excluded):

Str.	unknown	bowl	jar	cooking	krater	jug	small.cont	chalice
0	9	179	71	119	13	63	6	1
1	2	83	41	48	3	25	2	0
2	1	102	61	86	11	35	4	2
U3A/W3	1	151	87	112	18	50	4	6
U3B/W4	5	242	97	167	12	90	24	13
U4	0	16	4	5	0	4	1	1
U5	0	6	6	3	0	2	0	0

Expected:

Str.	unknown	bowl	jar	cooking	krater	jug	small.cont	chalice
0	3.96	171.50	80.80	118.88	12.55	59.22	9.03	5.06
1	1.75	75.89	35.75	52.61	5.55	26.21	3.99	2.24
2	2.60	112.35	52.93	77.88	8.22	38.80	5.91	3.32
U3A/W3	3.69	159.59	75.19	110.63	11.68	55.11	8.40	4.71
U3B/W4	5.59	241.81	113.92	167.62	17.69	83.50	12.73	7.14
U4	0.27	11.53	5.43	7.99	0.84	3.98	0.61	0.34
U5	0.15	6.32	2.98	4.38	0.46	2.18	0.33	0.19

Standardized residuals

Str.	unknown	bowl	jar	cooking	krater	jug	small cont.	chalice
0	**2.88**	0.82	−1.36	0.01	0.15	0.60	−1.15	**-2.06**
1	0.20	1.08	1.02	−0.78	−1.16	−0.27	−1.06	−1.58
2	−1.08	−1.33	1.32	1.15	1.06	−0.71	−0.86	−0.79
U3A/W3	−1.58	−0.96	1.68	0.17	**2.10**	−0.83	−1.72	0.67
U3B/W4	-0.30	0.02	-2.10	-0.07	-1.65	0.92	**3.84**	**2.66**
U4	−0.52	1.67	−0.68	−1.24	−0.94	0.01	0.51	1.14
U5	−0.39	−0.16	1.93	−0.77	−0.69	−0.13	−0.59	−0.44

Approximative Pearson's Chi-Squared Test
data: stratum by class (unknown, bowl, jar, cooking, krater, jug, pithos, small.cont, chalice)
chi-squared = 96.5239, p-value = 0.072

Fig. 5.205 Cross tables of observed and expected occurrences of the vessel classes in each stratum

The differences between the strata are not statistically significant. This indicates fairly similar shares between the functionally defined vessel classes, and might reflect continuity in space use in the excavation areas under study. However, there are some interesting details in the cells that have higher differences between the observed and expected values, and therefore have higher residuals (**bolded** in Fig. 5.205). There are somewhat more vessels that could not be identified to a type or class in the mixed uppermost layer of topsoil. This is natural, as the material includes many eroded fragments and their identification is generally more difficult. The highest contribution appears in small containers from stratum 4 (3.84), which is most likely due to a single context inside room 4330, with an adjacent courtyard area that included a high concentration of restorable ceramics (28 vessels), of which eleven were small containers (flasks, juglets, and pyxides). This anomaly hints at a special function for this space. The same phase also has slightly more chalices than would be expected, and major part of them derive from the same room and its adjacent courtyard.

5.3.4 Summary and evaluation of the statistical methods

What did we learn from the analyses above? Was it worth all the trouble? First of all, statistical insights have indeed shown that some differences between the vessel classes and types are not merely mental constructs, but have some equivalence to the real items studied. Such stable patterns appear between several features, such as vessel type, rim form, ware, and size attributes. Also, there are some differences that may reflect chronological differences. Between the Foundation Phase and the Main Iron Age I Horizon the rim diameter in jars changed. However, the small amount of items from the earliest Iron Age phase, resulting at least partially from its smaller scale of excavation, has the effect that such comparisons can be reliable only within a few, most common vessel groups. The similarity of the size related diameter in the two analyzed vessel groups was fairly constant throughout the Main Iron I Horizon and the later phases of the Iron Age. This may be explained by a strong continuity in potting practices during these phases of occupation. More comparable analyses, both on other vessel classes as well as using other observed features, could be run in order to validate the results. Statistical methods allow one to test whether the differences and similarities in the material might be due to coincidence. Statistical thinking is prone to make one more aware of the many phenomena that bring about uncertainties, and to be more suspicious about associations that one would like to see. Such a critical attitude towards the results of one's own work should be welcome in the study of archaeological artifacts, as in any study.

The distributions of single variables and the relationships between variables could be further used when planning subsequent recording processes. The low variability of hardness may indicate that measurement of that variable was probably measured on too coarse a scale. A more exact scale might have brought about variability. On the other hand, it may well be that hardness was not a well-suited variable to trace the technical development in firing conditions. One might better access the firing conditions using the color of the core of the vessels. There was a close relationship between the colors of the inner and outer surfaces. This indicates that one could record only the color of the outer surface without a loss of any significant amount of information. However, in the small closed vessels the inner surface was often similar to the color of the core, which makes the color of the inner core a variable with significance for distinguishing small closed vessels from small bowls or jars.

Statistical methods are not a shortcut to objective or sure results, and they offer no panacea for otherwise obscure artefact studies. However, the consistency of the statistical methods does help to establish the patterning in the data. The use of statistical grouping of variables as well as objects forces the researcher to be explicit about the features that are considered important for the formation of classes and types. The measuring of features like thickness, instead of relying on a designation of thick versus thin, enables the results to be more accurate.

5.4. Comparison and Synthesis of Typology and Quantitative Studies

Conventional typological classification has usually been based on tradition and the grouping of new material, where intuition plays an important role. By tradition I mean the results of previous research: earlier typologies and other studies of comparable materials. Also, the features that have been considered to be important chronological or cultural markers are paid special attention to, while features that have not played a significant role at other sites will easily go unnoticed. However, each site has a pottery assemblage that has its own distinctive features, and some differences may be of importance at one site while they are not at another. For example, some pottery type may portray chronological patterning at one site and not at another. This seems to be the case with decorated spherical jugs: at Dor they portray chronological development in decoration, while at Tel Kinrot this is not the case. Therefore, defining sub-types according to decoration may be meaningful at Dor, but be irrelevant for the material at Tel Kinrot. Statistical analyses alone would not enable interesting relationships to arise with other sites, as comparable data-sets do not exist. Relations to other sites require traditional typological study of the comparable vessels from other sites.

Statistical tools and traditional descriptive pottery studies can make a powerful combination. Statistical methods allow one to better evaluate patterns and their strength. However, one can only use statistics with things that one has been able to measure in some way. The quality of the data is essential: no refined method enables one to produce a high quality analysis from low quality data. Therefore, the planning of analyses should predate the data collection, which should itself start with a pilot study. Statistics are powerful with masses of data, but helpless with unique items and their description. In statistics, unique items are troublesome outliers, while at the same time they may be highly interesting for archaeological interpretation, such as a distinctive decoration pattern appearing on two sites of the same period. Through intuitive thinking, people can easily combine features of different scale, such as intelligence and height, with the general knowledge of what is common, and by judging the observed feature as related to its normal value; the metrics are scaled easily and unnoticed (Kahneman 2011: 93–95). Intuition may, however, lead one astray. In statistical methods it is generally complicated to use variables of different measurement scales. Usually one has to use methods that suit either continuous variables or categorical variables. The “unsuitable” variables then either have to be left out or converted into the other scale. In the latter case, one either has to pay the price of creating complicated data sets with many binary variables when converting categorical variables into continuous ones, or when converting continuous variables into classes (e.g. thin, medium, and thick for the wall thickness) one loses information.

Statistical tools have their costs as well. One needs to process the material in order to render it in a format that can be used as data for statistics. That requires pre-planning for the documentation, and the process of coding the chosen attributes is likely to take more time if statistical analyses are planned. This may, however, have the positive effect that one pays more attention to the selection of the features that will be included, and makes explicit what they should reflect in archaeological terms.

Chapter 6 Conclusions and Future Prospects

To return to our original question: How much do the individual perspectives and adopted methods of researchers effect the results of their research projects? Very much indeed! Therefore, it is essential to make the process transparent from its beginning to the end. This means explicitly stating the assumptions concerning the central themes of a study, the ways by which the material has been selected, and the typological classes constructed; in addition, documenting the methods of analysis and giving a reason for the selected format of presenting the results. All research is bound to be selective in some respects. What is needed is transparency regarding the selections.

This study began with descriptions of the pottery material from one site, but from two projects with different retrieval strategies: informal and intuitive selection in the earlier project led by Fritz (1994–2001), and a systematic sampling strategy in two new excavation areas during the excavations of the Kinneret Regional Project (2003–2008). The asymmetry between the pottery assemblages from the projects, both in terms of the number of items and their state of preservation, started to intrigue me during the descriptive phase. The difference was related to the different retrieval strategies for the pottery. The decisions of what is kept and analyzed from the excavated materials are made early in the research process, and they have a strong impact on the resulting artifact assemblage. The nature of an assemblage restricts the ways that the material can be analyzed, and what kinds of results can be expected. It would be a gross over-simplification to say that the informal selection was bad and the systematic sampling is good. These two selection strategies serve different purposes.

I wanted to present tools for the evaluation of the usefulness of the more intensive retrieval and analyses of ceramics. For this purpose, I ran a selection of statistical analyses that gave insights for somewhat different aspects of the pottery. I validated the relatedness of several observed variables with factor analyses, and the typological classifications with the help of discriminant analysis. I was able to confirm a difference between rim diameters of jars from the Foundation Phase of the Iron Age compared to those of jars from the main phase. However, such a difference did not appear in cooking pots. Intensive retrieval allows a firm basis for functional interpretations of the archaeological contexts, because the research-based bias in vessel groups can be avoided.

The aim of this thesis was to describe and reconstruct the process of archaeological artifact study from its beginning to the end: from the retrieval of the finds, to the selection of the items to study further, to their classification, and to their description and analyses. Each part of the process affects the results, which in turn provides the basis for later interpretations of the material. Explaining all the steps provides the audience with the means to evaluate the reliability of the results and their interpretation.

6.1 Increasing Information

The information that is gained through a detailed analysis of masses of shards is different from that gained through a study of a smaller selection of well-preserved items. The amount of detailed information in the intensively retrieved shard material is evident. However, its interpretative power is not. It seems that this is due to the lack of an articulated research problem at the outset. My study of the Tel Kinrot pottery was initiated by the belief that a more detailed study upon a representative amount of material would enable a more precise dating of the habitation layers at the site. The point of departure was typological and chronological, and the selection of variables to measure was dictated by features traditionally considered important, and thus closely related to chronological and typological framework.

As different retrieval practices serve different purposes, I outline here three different possible strategies and questions which they would be able to answer. The first strategy can be equated with the informal strategy used by Fritz (1994–2001), and the third matches the strategy used in the intensively retrieved areas of the Kinneret Regional Project (2003–2008). The second strategy is a compromise between these two, not used at Tel Kinrot, but potentially useful.

1) Intuitive, informal selection of diagnostic material from important loci

At Tel Kinrot, the informal selection was chronologically motivated. The items that were identified as to their chronological period were mostly well-preserved. This kind of assemblage can provide presence/absence data of artefacts with an agreed chronology (known date according to the prevailing state of research). It can be used for the **relative dating of selected contexts** and for **defining cultural connections** reflected in the material. However, its later evaluation is difficult if the reader is not provided with information about the security of the chronology of the artifacts present; and the un-identified material is discarded, distorting later analyses. The well-preserved artefacts are likely to be biased, and represent only a fraction of the material from the site. Within the material retrieved by the informal selection at Tel Kinrot, the most common vessel groups of bowls and cooking pots were under-represented, and the rare groups of lamps and small containers, which are easy to identify, were over-represented. When the amount of items is small, the probability of incidental connections arising instead of stable patterns is higher than in a study with large samples.

Parallels found for the material in a typological study may provide a relatively stable chronological framework, cultural background, and insights into the cultural contacts of the ancient population. My typological analysis of the Tel Kinrot pottery, indicated that the material from the Foundation Phase of the Iron Age settlement and the Main Iron I Horizon on the slope can be dated to the time sequence from the beginning of the Early Iron Age to the transition of Iron Age I–Iron Age II, while the latest phase of occupation on the slope may continue to Iron Age II, indicated by some ceramic vessels that typologically seem to date to Iron Age II. I identified the pottery comparable with other sites of the Early Iron Age in the Jordan rift valley. Some pottery types also seem to reflect contacts with the Phoenician coast.

The typological literature could and should be developed in a reflexive direction in order to enable readers to assess the constructed types. This is also possible with informally selected material.

2) *Intensive retrieval with a gross chronological and functional identification of items*

This option means that material is consistently (or at least from layers below the uppermost mixed contexts) kept according to an explicit strategy, such as keeping all rims, but registering them with only a minimum information, such as estimated chronology and a gross functional classification. If all rims are kept and counted, the material can be considered representative of all excavated materials and a research-based bias can be avoided. With such an assemblage, we gain the possibility to **compare different excavation areas and stratigraphic phases** both regarding their **a) chronology, and b) functions**. This means that we can check if the areas correspond with each other or differ from each other in these respects. For example, the chronological uniformity of ceramics in all Iron Age phases at Tel Kinrot corresponds with stratigraphic observations indicating continuous building activities, and can be interpreted to indicate a short time sequence. This observation could have been made without detailed observations regarding the diameter, thickness, color, and ware of the shards.

When the counting of chronologically identified items is combined with their functional categorizations, the reader is **better able to evaluate both the chronological and functional interpretations** made by the excavators, as the chronological time spans and ease of recognition differ from one vessel group and time period to another. It is important that when the material is kept and stored it is possible to study the material anew later, when the scholarly consensus has perhaps changed in some respect. Frequency tables of vessel classes and types are reliable only if the retrieval of the material is systematic.

The risk of seeing the evidence as you supposed it to be, by acting in a way that strengthens one's own pre-suppositions, is diminished when the assemblage does not only consist of the types that were easy to interpret according to the prevailing knowledge. This kind of procedure was not used at Tel Kinrot, but its implementation would not require much more resources than the retrieval strategy used at Tel Kinrot for the areas not included in the intensive retrieval and study of all rims in detail. If one is interested in the functional interpretations of excavated contexts, the vessel functions are of importance, and their amounts as well - not only simple presence/absence data. Such identifications are often quick to make, and could be made during the field season with a small additional work force. Such information could already be helpful for the area supervisors during the excavation season.

3) *Detailed analysis of an intensively retrieved assemblage*

When the analyst also records details of form, size, ware, etc. the reader is better able to assess if the identifications made are valid. Opening up the recorded details makes it **explicit upon which features the chronological, functional, or other interpretations rely.** One is now also able to test whether the features considered of chronological or functional significance really differ from each other in different phases or contexts to a statistically significant degree

– confirming if the differences reflect **real differences** and would not be attributable to chance and random variation. We are able to reach **firm ground for the type descriptions**, as we can test which of the observed features really differ between the constructed types, and between which of them. Recording several different features that reflect several stages of the operational sequence of the potter can be used to **evaluate and improve the typological categorization** constructed for the material, and used for chronological and functional interpretations. This retrieval practice enables the evaluation of the categories that are used for interpretations, while in cases 1 and 2 above the typological classification is the primary if not only tool for analyzing the material. Here, the reader is allowed access to the type construction. Since we are recording the features that we think are essential for the interpretation of the material, the reader does not need to blindly accept our type designations, but is able to evaluate them.

At the same time, we are able to define what features remained constant at the site during the studied period. The latter observation enables us to draw a profile for the local potting practices. In the case of Tel Kinrot, the statistical analysis indicated a strong continuity of potting, probably indicating that the time sequence was rather short, as chronologically sensitive differences in the rim diameter were only found in storage jars but not in cooking pots. Now one is able to actually analyze how well the constructed types and recorded features correspond with each other, e.g. whether the clay preparation of a certain functional vessel group is different from that of other vessels. Statistical analysis lessens the need to rely on intuition, as the observations and their relationships can be measured. Analyzing recorded details also enables one to present the variation within the constructed vessel types, making the typology capable of dealing with the fluidity of ceramics. This makes a typology more realistic.

If the study aims at a holistic reconstruction of the history of a site, the shard analysis can help us to find some fine grained typological developments, though the developments are not always patterned or uni-linear. The fine grained developments of clay preparation, size related attributes, or frequencies of surface treatments would not be discernible during a quick field reading. Such details have the potential for refining typological trends in pottery, but their identification requires detailed recording, systematic sampling, and a fairly large data set. This requires more resources: storage place, time, and a work force to analyze the material. Success is also dependent upon the features recorded, the scale and accuracy of their measurement, and the variation within the material. The variation in different features might differ from one period and site to another, and a pilot study of the material to be studied is needed in order to be able to select relevant features and proper methods of measurement.

It is essential to acknowledge that increasing information is not equal to increasing knowledge. More detailed recording of artifact features increases information, while making the process of research transparent for the academic community, and increases understanding of the ways the interpretations may be constructed. Both are relevant aspects of knowledge.

6.2 Future Prospects

There are at least two fields for which a study of shards might yield insights: the study of formation processes and the study of clay preparation. Formation processes include various events caused by humans, as well as nature, that affect the conditions of artefacts in the ground. The appearance of shard material as "worn" may help one separate, for example, a constructional fill with worn shards of earlier periods from an accumulation during occupation, with pottery less worn and more homogeneous in a chronological sense – or a courtyard material that was exposed for the elements from material deriving from a room. This kind of information might be noted already during the field reading, and would not require a detailed analysis of each shard. A simple check-box for marking the material as "worn" or not, in the form of presence/absence data with a clear and articulated definition for what is considered worn, would in most cases suffice.

Changes as well as continuities in clay preparation reflect aspects relating to the modes of production. Clay preparation techniques and the used tempers are best studied by use of petrography. If one also wishes to define clay sources and provenience data, the analysis should combine petrography with the chemical study of the pottery and clay sources. However, such techniques rely on a close study of samples from a larger mass of items. Establishing a firm relationship between petrographic and macroscopic information also requires detailed macroscopic descriptions, in order to compare these bodies of information and to draw inferences from a sample to the whole ceramic assemblage. In the best scenario, such a study could be combined with experimental or ethnographic aspects of production.

It is important to plan the artifact studies beforehand, and to run a pilot study in order to determine which variables are meaningful with respect to the aims of the project. As long as excavations focus on reconstructing the culture history of a site, a selective retrieval system is a good, practical tool. By using generally accepted chronological and cultural markers, the excavator can rather easily define the chronological horizon and cultural sphere one is working with. However, one needs to be aware of the minefields that accompany typological work, such as the circular reasoning that may appear when identifying residual or intrusive materials from contemporary ones on typological grounds only. It also needs to be acknowledged that typological dating has its limits regarding the accuracy of dating, and one should not expect a precision of less than half a century between different sites. As soon as one poses other questions, one has to change the methods employed as well. Valid interpretations of provenance require the employment of physical sciences, as the typological insights can give only tentative results for such questions. If the interest lies in pottery making traditions and the changes therein, one needs to have a broad, systematic sample of all produced vessels of interest, as well as insights from petrography, in order to identify the preparation techniques of the clay.

It is possible to pose new questions for materials collected with old methods, though there are restrictions. It is indeed the case that archaeologists often study materials excavated by a previous generation. Archaeological research projects often produce information that was not, at the time of collecting, considered important, but is rather a side-product of other processes. Such information may afterwards turn out to be interesting. Archaeological materials are always to some extent unpredictable, and one has to be flexible in the field as well as in the recording practices. Even though the original research question should guide the methods used, transparency in the used methods further enables diverse insights in new directions, which the next generations will hopefully find interesting.

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In addition I've had the possibility to use all the documenting in the Database of the Kinneret Regional Project including field readings of pottery, locus cards, find cards, measurements and maps. I also have had access to the locus cards of Areas E, F, G, H, J, K, M, N, Q R, S and T of the campaigns lead by Fritz in 1994–1999 and find cards of these campaigns archived in Mainz.

Interviews

AK 2014 Axel Knauf, Tuesday 8th April 2014 over Skype (Universities of Helsinki and Bern)
AW 2013 Anke Welzel, Thursday 2nd May 2013, Berlin, informant's home.
MA 2013 Merja Alanne (former Kaario) Tuesday 30th April 2013, Helsinki University (in Finnish)
MH 2014 Martin Hallaschka, Sunday 14th September 2014, Hamburg University.
PS 2013 Pekka Särkiö Friday 26th April 2013, Helsinki (in Finnish) at the headquarters of Finnish defence command.
SM2014 Stefan Münger, Tuesday 4th March 2014 and Thursday 13th March 2014 over Skype (Universities of Helsinki and Bern).

The original recordings in WMA-format of all interviews and transcriptions of AK, AW, MA PS and the second interview of SM are all archived by Tuula Tynjä.

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APPENDICES

Appendix 2B rim forms drawn by TT.

Appendices 3 and 4: photos 3B, 3C, 4G and 4L by TT.

Appendix 5A: photos of items 10269/3, 10239/19, 10847/2, 10279/5, 10291/2, 10280/4, 10999/2, 10356/1, 10270/2, 10884/1, 10247/1, 10239/17, 10256/4, 10896/12, 10310/6, 10515/2, 10231/5, 10272/9, and 10256/1 by TT.

Appendix 5B: photos of items 10304/9, 10304/11, 10419/1, 10410/4, 12299/3, and 10244/2 by TT.

Appendix 5D: photos of items 12087/14, 10272/11, 10239/22, 10239/24, 10272/2, 10243/7, 10243/7, 10310/2, 10243/23, 10239/27, 10947/2, 10282/7, 10262/1, 10243/5, and 10511/3 by TT.

Appendix 5E: photos of items 10292/7, 10462/1, 10284/3, 10863/8, 10946/2, and 10305/3 by TT.

Appendix 5F: photos of items 10506/4, 10624/4, and 10897/3 by TT.

Appendix 5G: photos of items 10947/1 and 10480/2 by TT.

Appendix 5H: photos of items 10239/31, 10796/1, 10776/3, 10625/6, 10759/1, 10863/11, and 10427/1 by TT.

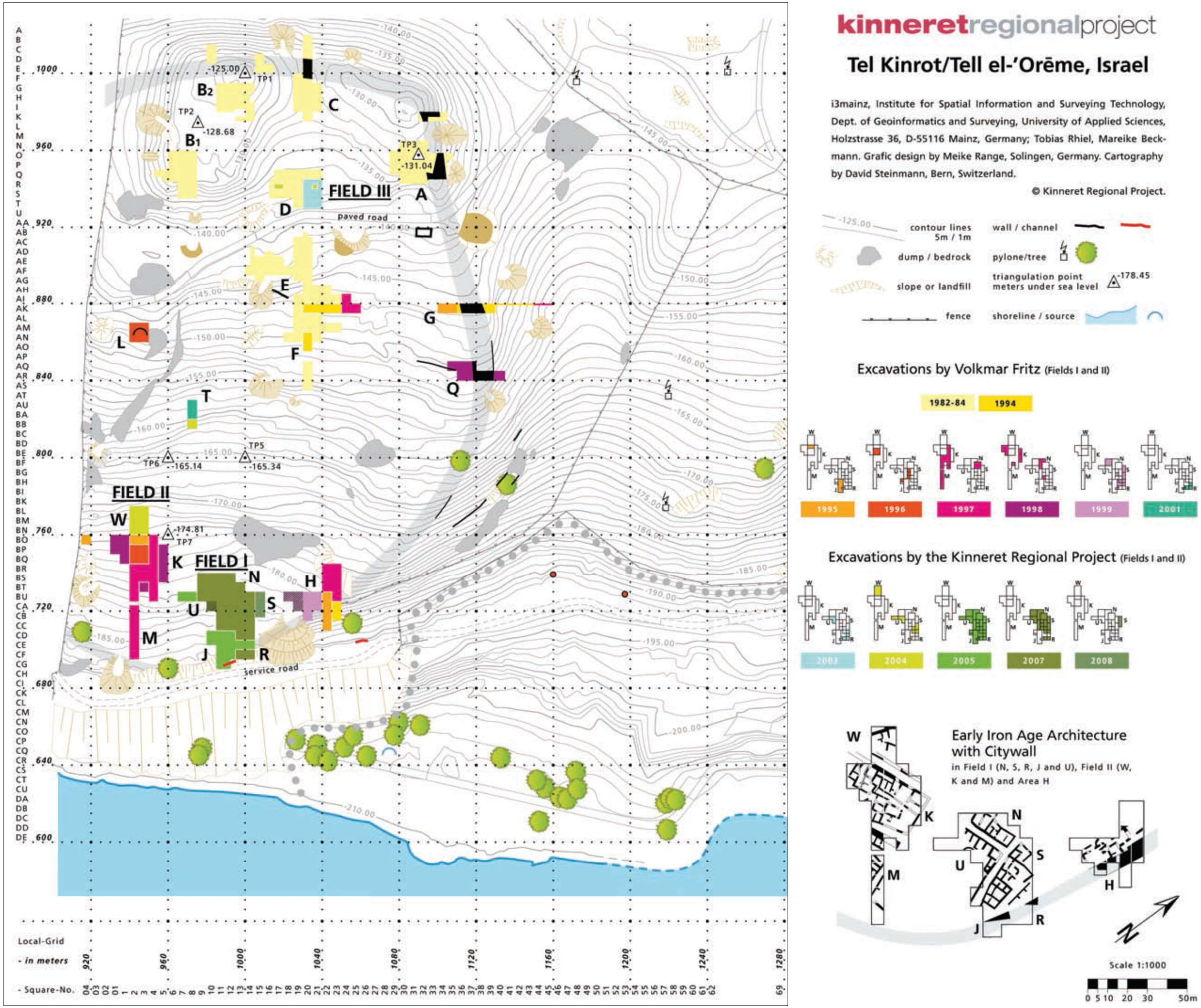
Appendix 5I: photos of items 14128/12 and 10538/4 by TT.

Appendix 5J: photo of item 10765/2 by TT.

Appendix 5K: photo of item 10620/2 by TT.

Appendix 5M: photos of items 10848/6 and 10972/4 by TT.

APPENDIX 1. General plan of Tel Kinrot accessible now, with its environs, excavation areas and topographical features. Drawing by David Steinmann and Meike Range; © Kinneret Regional Project. (Münger et al. 2011).



APPENDIX 2A
BACKGROUND QUESTIONS AND INTERVIEW STRUCTURE OF FIRST INTERVIEWS (PS, MA, AW)

BACKGROUND QUESTIONS (PRE-INTERVIEW/AW)

a. When did you take part in the Kinneret excavations?
b. Why did you join the excavations?
c. What was your education at that time?
d. What was/were your role(s) during the season(s) you participated?
e. How long where the field seasons?
f. What was the composition of the excavation staff (which tasks were present)?
g. What were your own tasks?
h. How often did you take part in the pottery reading and what was your role in it?

THE ENGLISH INTERVIEW STRUCTURE (ALL)

a. What were your own tasks?
b. What kind of instructions did you receive?
c. What kind of forms and other means of documenting were used?
d. How the forms were filled?
e. What was filled in the find cards?
f. How the documenting was instructed and by who?

g. How the loci were defined?
h. How would you describe the treatment and documenting of architecture?
i. How would you describe the treatment and documenting of earth features?
j. How the field reports were written and their writing instructed?

k. How would you describe the pottery reading?
l. How was the registered pottery selected?
m. What kind of selection process was in relation to bones or stone implements?
n. Who were the people involved in the selection process?
o. What was your own role like?
p. What kinds of reasons were essential for the selection of materials?
q. How would you describe Volkmar Fritz as an excavation director!
r. How would you describe the excavation?
s. What was your own position in the organization like?

Appendix 2A (cont.)

Background questions and interview structure of last interviews (SM, AK, MH)

Background questions: Tell me about your history at Tel Kinrot excavations!

1. When did you take part in the Kinneret excavations?
2. How did you join the excavations?
3. What were your roles there?
4. How was the excavation staff?

The interview structure

1. **Tell me about the practical work in the 1990's!**
2. What were your tasks?
3. What kind of instructions did you receive?

4. **Tell me about the documentation!**
5. What kind of forms and other means of documenting were used?
6. How the loci were defined?
7. How would you describe the work with architecture?
8. How about the earth features?
9. How about soil samples?
10. Was the soil sifted?
11. How the field reports were written?

12. **Tell me about the selection of finds!**
13. How would you describe the pottery reading?
14. How was the kept pottery selected?
15. How about the registered ceramics?
16. How was the process like with bones or stone objects?
17. What kinds of materials were selected?

18. **How would you describe the excavation organization?**
19. What was your own position in the organization like?

20. **Is there still something you think might be important?**
21. **Is there something you want to ask?**

RIM TYPES. Upright rim part and rim following the line of the wall

1:rounded simple
1B:simple rim, cut lip
1C:rounded, thinned lip
2:thickened inside
2B:thickened inside, flattened from above
2D: rounded thickening below the lip
2C: thickened inside below the (thinned) lip
2F: thickened inside, grooved/ridged
2I: beaded rim inside (thickened inside in form of a bead)
3:thickened outside
3B:angular thickening outside below the lip
3C:thickened outside, flattened from above
3D:thickened outside, made by turning over (hole in the middle)
3E:thickened outside on the lip and below
3F: thickened outside, grooved/ridged
3G: thickened outside below the lip, thickening grooved
3H:upright rim part, ledge rim (outside thickened)
3I: beaded rim (lip thickened in form of a bead, turned out)
3J: thickened outside below the lip
4:thickened on both sides
4B:T-shape (rounded T)
4C:thickened both sides, flattened and grooved from above
7:over-hanging rim
8: over-hanging, ridged/grooved rim
9:rounded rim with angular thickening inside below the lip
10:square rim, thickened outside
10B:flattened square, thickened outside
11:upright rim part, thickened below the lip outside (like band)
11B:upright rim, strong thickening outside below the simple rim
11C:upright rim, rounded thickened lip, thickening below the lip
11D:upright rim, simple triangular rim
11E: upright, grooved triangular rim

everted (when compared with the direction of the wall)

5: everted, simple rim
5A:everted rim with rounded lip
5AB:everted rim thickened outside. rounded lip
5B:everted rim, simple triangular lip
5BB: everted rim, thickened below the lip (slightly triangular)
5C:everted rim, hooked triangular lip
5D:everted rim, grooved triangular lip
5E:everted rim, thinned lip
5F:everted rim, flattened and rounded lip
5G:everted and flattened rim, grooved lip profile
5H:everted rim, flattened and simple lip
5I:everted rim, cut lip
5J:everted rim, triangular, round edged rim
5K: everted rim of the type 3E
5L: everted rim, thickened inside
5M: everted, ledge rim
5N: everted rim, thickened outside, flattened
5O: everted, thickened on both sides, flattened & grooved from above

inverted

6A:inverted rim with rounded lip
6B:inverted rim, simple triangular lip
6B2:inverted triangular, round edged rim
6B3: inverted triangular, rounded upper part
6B5: inverted triangular, edge and upper part rounded (B2+B3)
6C:inverted triangular, hooked rim
6D:inverted rim, thinned lip
6E:inverted, grooved triangular rim
6F:inverted rim, outside thickened, rilled lip
6G:inverted rim, thickened lip (both sides)
6G2:inverted rim, thickened lip (inside)
6G3:inverted rim, thickened lip (outside)
6H:inverted rim, thick ledge lip (outside)
6I: inverted, ridged triangular rim
6J: inverted triangular rim with gutter at the edge
6K: inverted, beaded rim (thickened on the outside)
6L: inverted rim, thickened out and flattened
6M: inverted rim, cut lip

Appendix 2B. Original rim types used in registration 2003–2008.

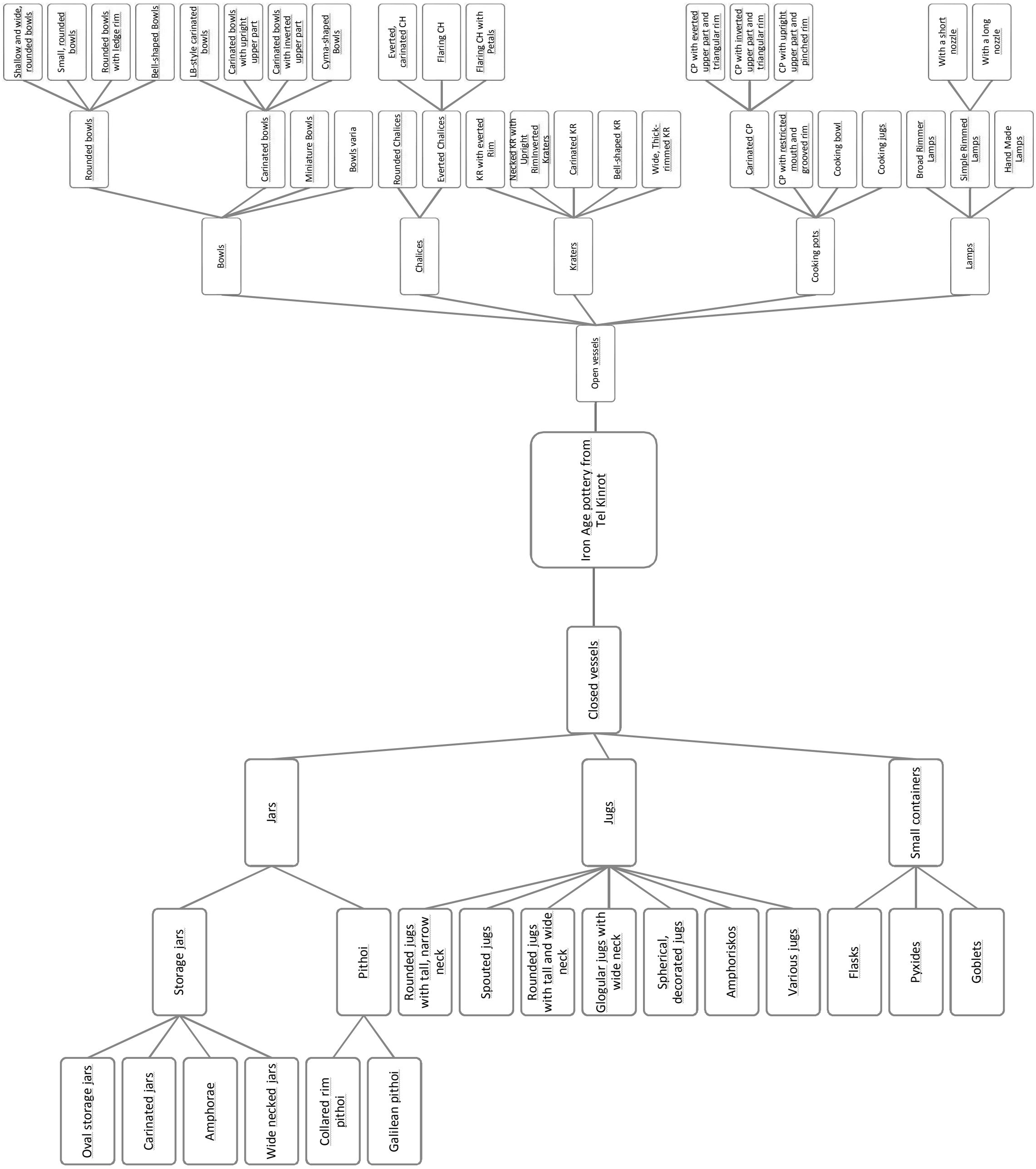
Appendix 2B (cont.) combined rim forms and their frequencies

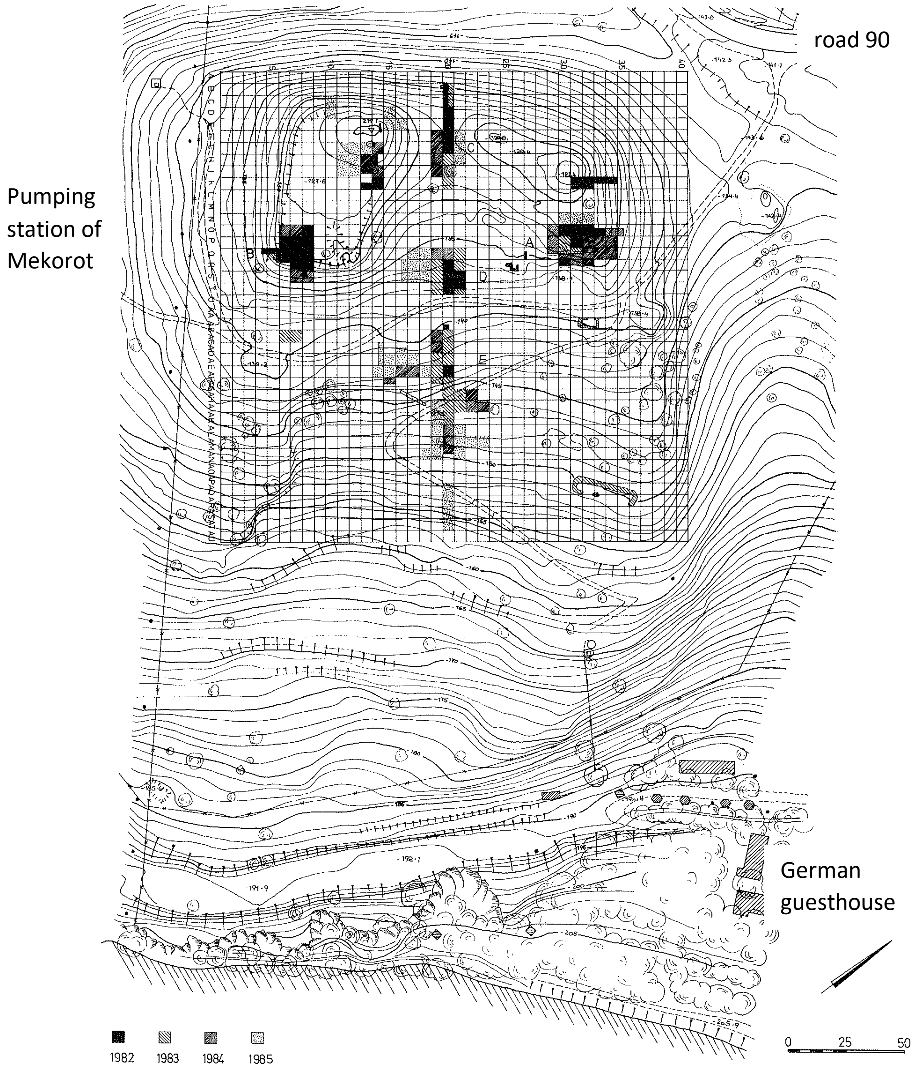
Rimtype	bowl	cooking pot	jar	jug	krater	pithos	small container	Sum	description
0	28	1	2	6	0	0	0	37	unknown
10	3	0	1	0	5	0	0	9	thickened out, square (combined with rim 3C)
11	1	0	0	9	5	0	0	15	thickened out below lip (combined with rim 3J)
11D	**2**	**199**	**9**	**9**	**58**	**0**	**0**	**277**	**simple triangular**
11E	1	12	1	0	2	0	0	16	grooved triangular (combined with rim 8)
1A	**157**	**7**	**47**	**65**	**10**	**4**	**20**	**310**	**simple rounded**
1B	**35**	**5**	**7**	**7**	**5**	**0**	**4**	**63**	**simple, cut**
1C	**54**	**1**	**18**	**4**	**0**	**0**	**2**	**79**	**thinned**
2A	**56**	**1**	**22**	**6**	**9**	**0**	**2**	**96**	**thickened in**
2B	35	0	2	0	5	0	1	43	thickened in, flattened from above
2C	3	0	0	0	0	0	0	3	thickened in below lip
2F	3	0	0	0	0	0	0	3	thickened in below lip, grooved
2I	2	0	1	0	0	0	0	3	beaded in (combined with rim 2A)
3A	**79**	**15**	**61**	**82**	**84**	**11**	**5**	**337**	**thickened out**
3B	6	5	1	5	8	1	0	26	thickened out, angular below lip (combined with rim 3J)
3C	**34**	**0**	**7**	**12**	**16**	**1**	**2**	**72**	**thickened out, flattened from above**
3D	0	0	1	0	4	12	0	17	thickened out, folded over (combined with rim 3A)
3E	**10**	**0**	**166**	**15**	**1**	**5**	**0**	**197**	**thickened on lip and below**
3F	0	0	3	4	13	13	0	33	thickened out, grooved (combined with rim 3E)
3G	0	0	0	0	4	0	0	4	thickened out below lip, grooved (combined with rim 3F)
3H	4	0	0	3	20	0	0	27	ledge rim
3I	6	0	1	5	1	0	0	13	beaded out (combined with rim 3A)
3J	**3**	**9**	**6**	**18**	**17**	**1**	**0**	**54**	**thickened out below lip**
4	9	2	2	12	6	0	0	31	thickened on both sides
4C	5	0	0	0	1	0	0	6	thickened on both sides, flattened from above
5G	1	0	0	0	1	0	0	2	thickened on both sides, flattened from above, grooved (combined with rim 4C)
6B2	0	23	0	0	3	0	0	26	pinched, rounded lower edge
6B3	**0**	**67**	**0**	**0**	**1**	**0**	**0**	**68**	**pinched, rounded upper part**
6B5	0	19	0	1	6	0	0	26	pinched, rounded edge and upper part
6F	0	4	0	0	4	0	0	8	rilled rim
7	**0**	**67**	**0**	**0**	**1**	**0**	**0**	**68**	**over hanging triangular**
8	**0**	**92**	**0**	**1**	**7**	**0**	**0**	**100**	**over hanging, grooved triangular**
9	0	0	0	0	1	0	0	1	angular thickening in below round lip
Sum	537	529	358	264	298	48	36	2070	

12 rim forms have over 50 observations (underlined), 9 rim forms with less than 10 observations. The rare rim forms are printed in red above.

The combinations refer only to the statistical analyses performed in chapter 5.3. The original registrations were not altered, but the combined rim types were added as a new variable.

Appendix 2C Tel Kinrot Pottery Types Diagram





Appendix 3A Map with excavated Areas from Fritz 1990, fig.2.

Appendix 3B. Road 90 and a water pumping station Sapir of Mekorot national water company of Israel, at the Southern side of Tel Kinrot. The acropolis is on the left side. To the North-East by TT.

Appendix 3

Appendix 3C Tel Kinrot (encircled) from the hill of Tabgha, to the South-west, photo by TT.

Appendix 3D Fieldwork during the KRP, Area S in 2008. Photo by Christa Lennert, to the South © KRP.

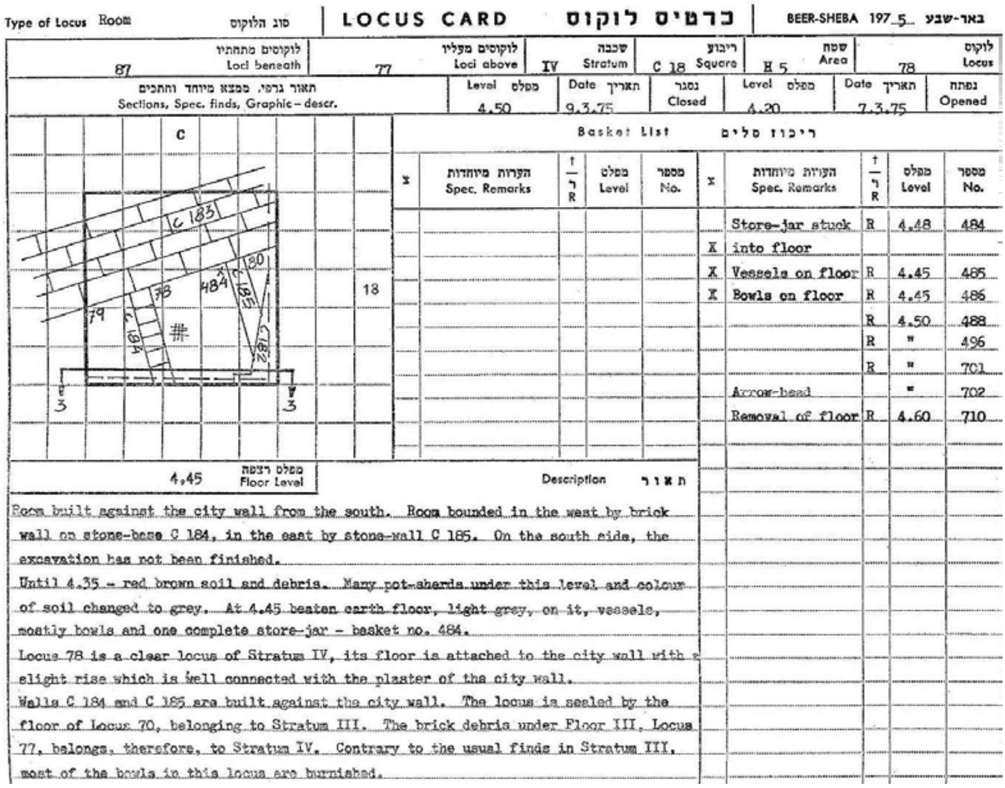


Fig. 7. Form 7: Locus Card

Type of Locus Room סוג הלוקוס | LOCUS CARD כרטיס לוקוס | BEER-SHEBA 197_5_ באר-שבע

לוקוסים מתחתיו Loci beneath	לוקוסים מעליו Loci above	שכבה Stratum	ריבוע Square	שטח Area	לוקוס Locus
87	77	IV	C 18	H 5	78

תאור גרפי, ממצא מיוחד וחתכים Sections, Spec. finds, Graphic – descr.	מפלס Level	תאריך Date	נסגר Closed	מפלס Level	תאריך Date	נפתח Opened
	4.50	9.3.75		4.20	7.3.75	

C

c 183 180 78 484 185 79 184 182 18 3 3

מפלס רצפה Floor Level 4.45

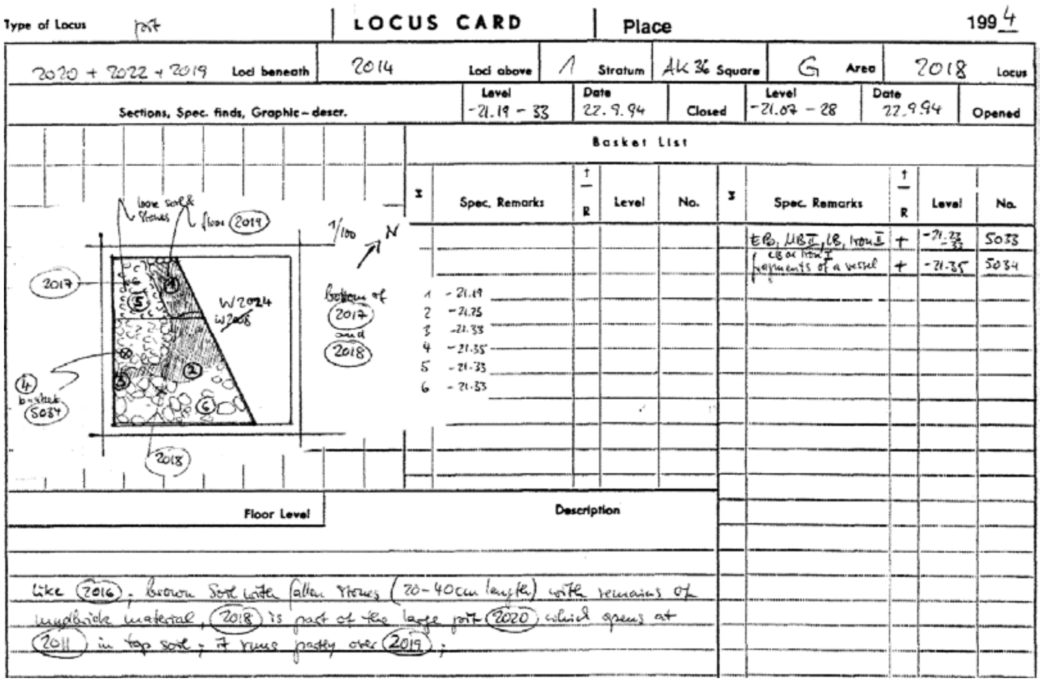
Basket List ריכוז סלים

x	הערות מיוחדות Spec. Remarks	R	מפלס Level	מספר No.
	Store-jar stuck	R	4.48	484
X	into floor			
X	Vessels on floor	R	4.45	485
X	Bowls on floor	R	4.45	486
		R	4.50	488
		R	"	496
		R	"	701
	Arrow-head		"	702
	Removal of floor	R	4.60	710

Description תאור

Room built against the city wall from the south. Room bounded in the west by brick wall on stone-base C 184, in the east by stone-wall C 185. On the south side, the excavation has not been finished.
Until 4.35 – red brown soil and debris. Many pot-sherds under this level and colour of soil changed to grey. At 4.45 beaten earth floor, light grey, on it, vessels, mostly bowls and one complete store-jar – basket no. 484.
Locus 78 is a clear locus of Stratum IV, its floor is attached to the city wall with a slight rise which is well connected with the plaster of the city wall.
Walls C 184 and C 185 are built against the city wall. The locus is sealed by the floor of Locus 70, belonging to Stratum III. The brick debris under Floor III, Locus 77, belongs, therefore, to Stratum IV. Contrary to the usual finds in Stratum III, most of the bowls in this locus are burnished.

Appendix 4A Locus card form from Beer-Sheba I, Aharoni et al. 1973: 130.



Type of Locus pit | LOCUS CARD | Place | 1994

Loci beneath	Loci above	Stratum	Square	Area	Locus
2020 + 2022 + 2019	2014	1	AK 36	G	2018

Sections, Spec. finds, Graphic – descr.	Level	Date	Closed	Level	Date	Opened
	-21.19 – 33	22.9.94		-21.07 – 28	22.9.94	

loose soil & stones floor 2019 1/100 N 2017 W2024 w2008 Bottom of 2017 and 2018 4 basket 5034 2018

1 -21.19
2 -21.25
3 -21.33
4 -21.35
5 -21.33
6 -21.33

Basket List

x	Spec. Remarks	R	Level	No.
	EB, MB II, LB, Iron I	+	-21.23 -33	5033
	LB or Iron I fragments of a vessel	+	-21.35	5034

Floor Level

Description

like 2016. Brown soil with fallen stones (20–40 cm length) with remains of mudbrick material, 2018 is part of the large pit 2020 which opens at 2011 in top soil, it runs partly over 2019;

Appendix 4B Locus card form Kinneret (form in use during 1994–1999).

Appendix 4 Documentation Forms, Field Work and Maps

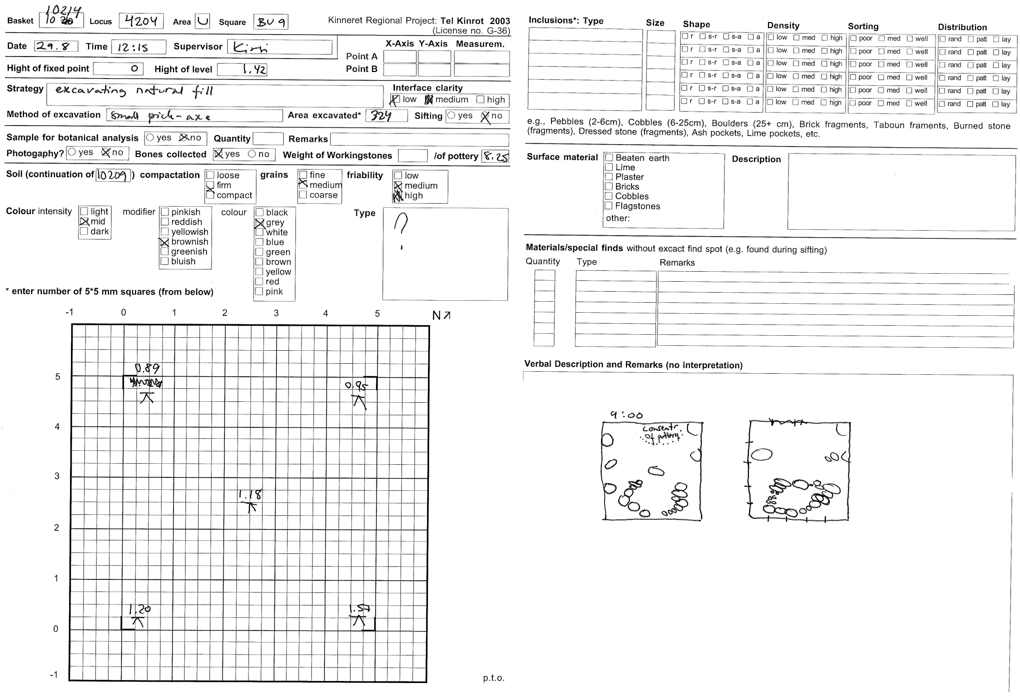


Fig.4C1 Basket documentation form for field from Area U (2003). Front side on the right, backside on the left.

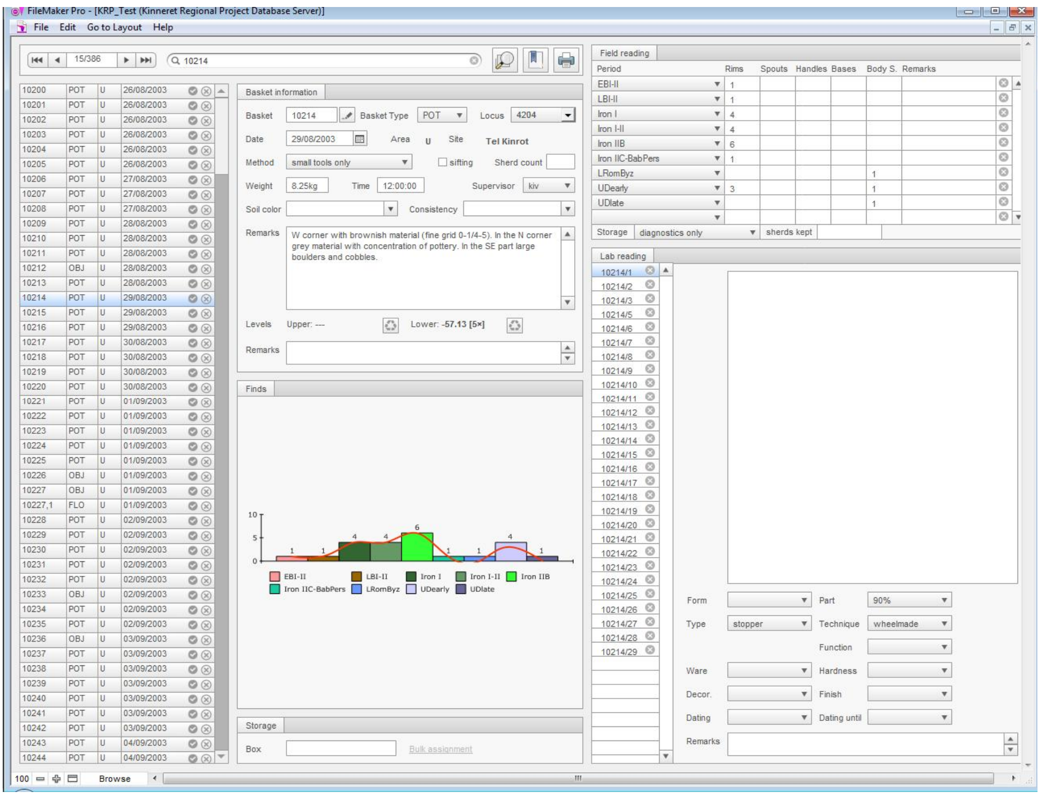


Fig. 4C2 Basket layout in the FileMaker Pro database of the same basket as fig.1 (layout 2008)

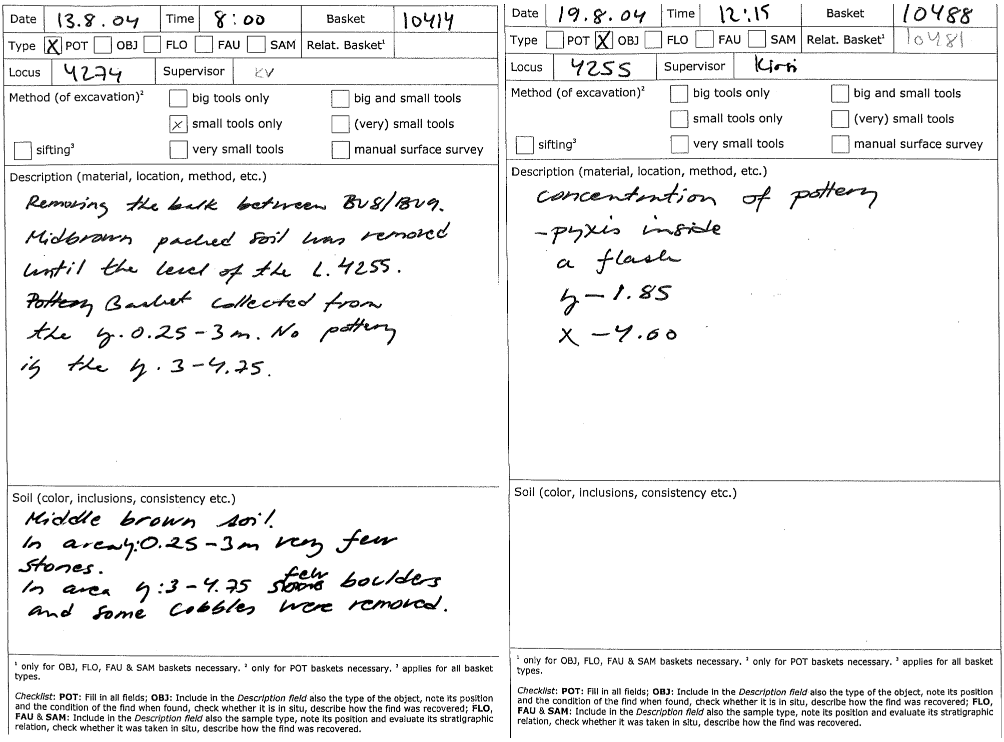
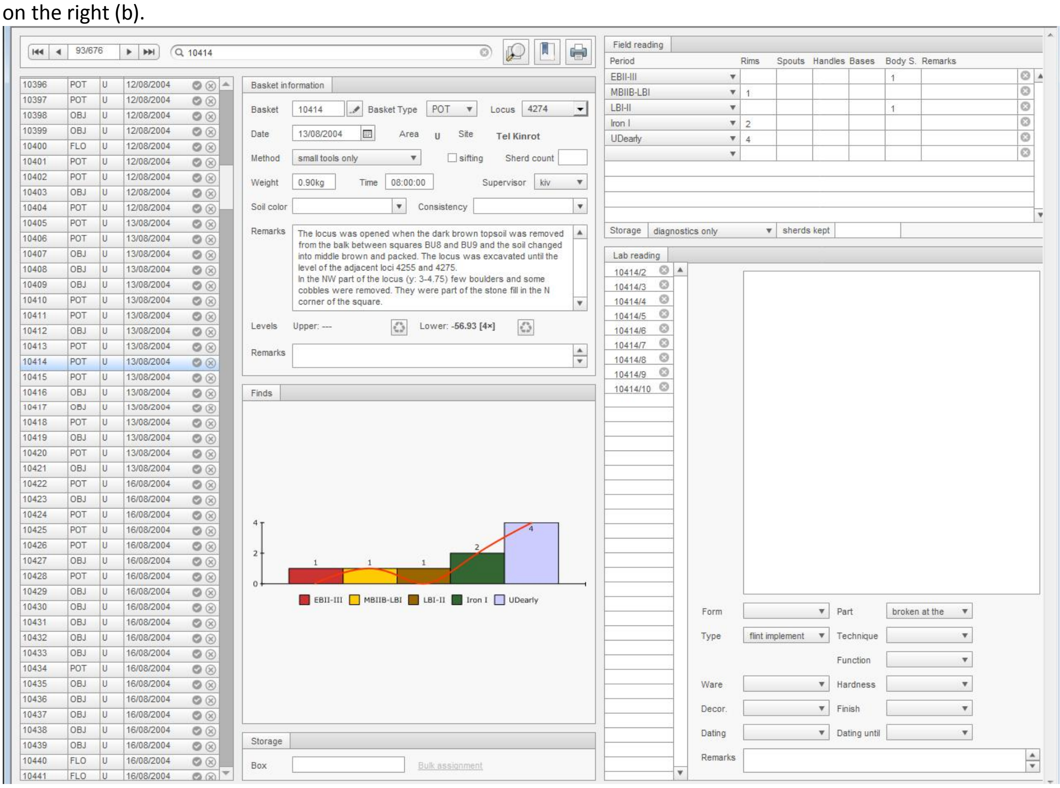


Fig.4D1 Basket booklet page for field documentation, Area U (2004). Pottery basket on the left (a), Object basket on the right (b).



App.4D2 Snapshot from the FileMaker Pro database of the same basket as fig.3a (layout 2008).

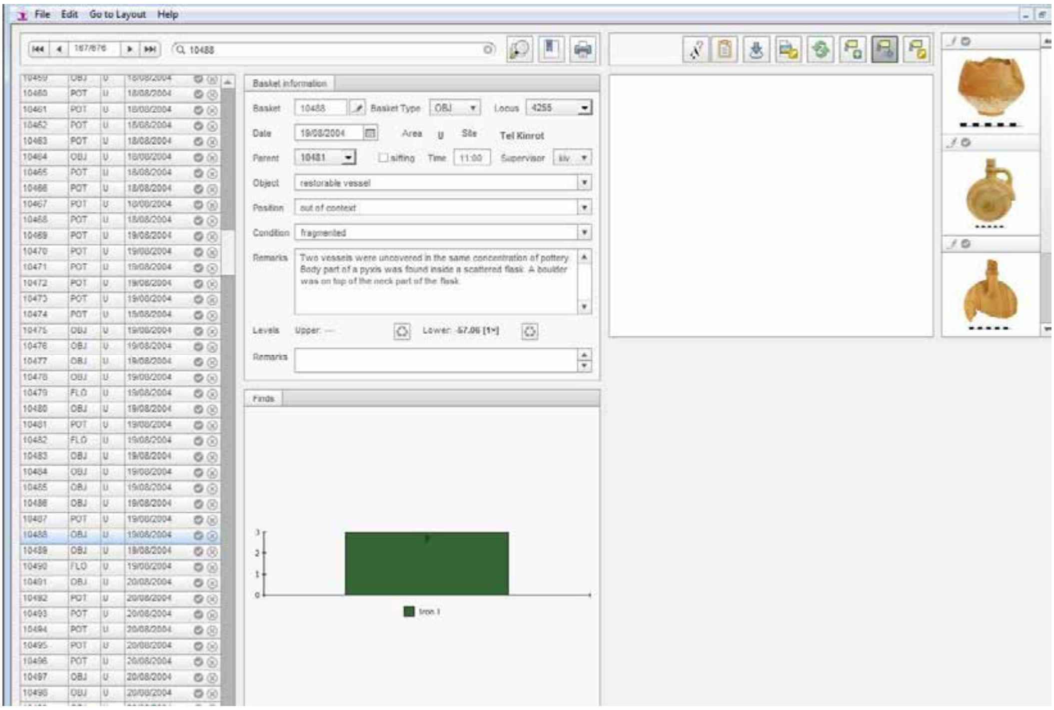


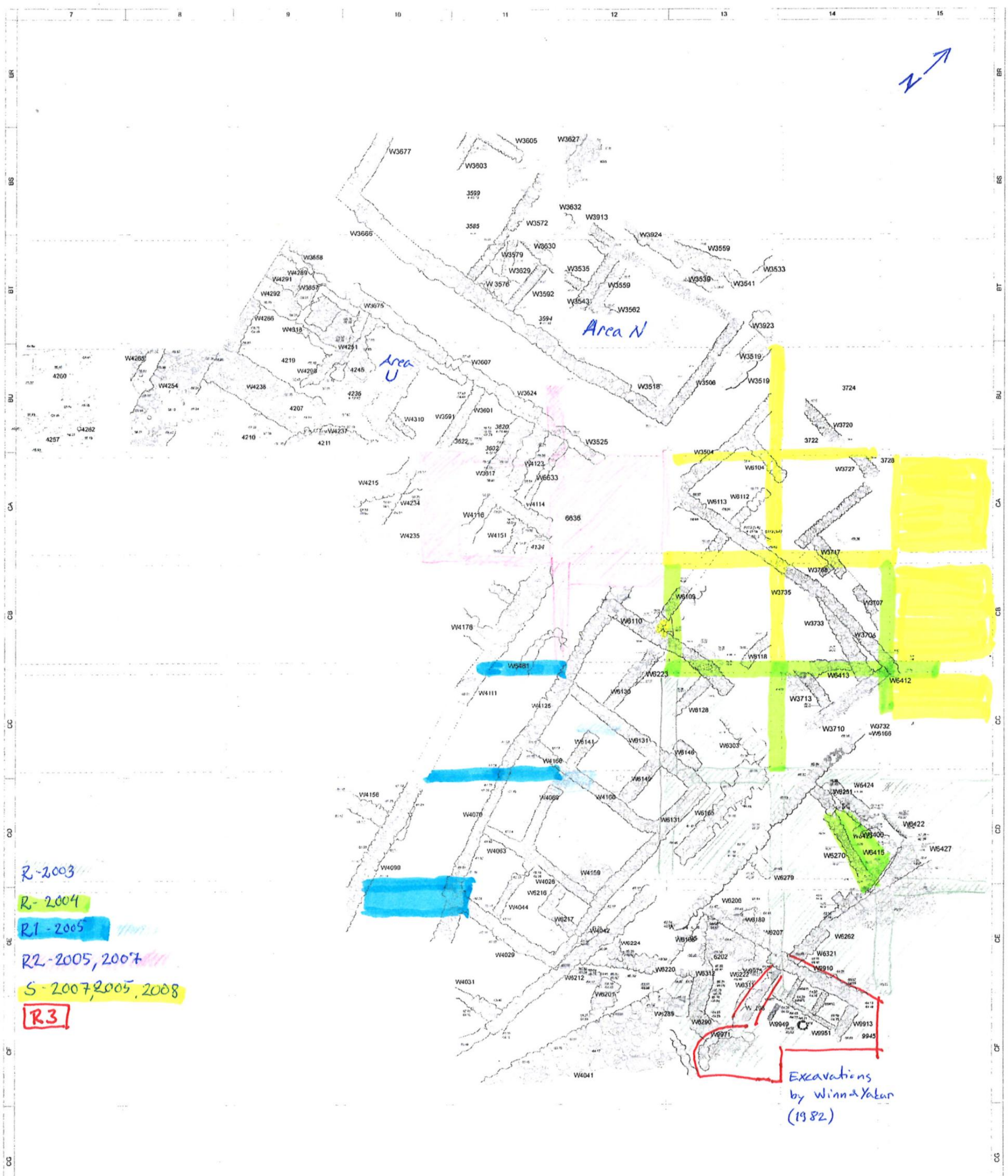
Fig.4D3 Snapshot from the FileMaker Pro database of the same basket as fig.3b (layout 2008).

Appendix 4E Fieldwork by volunteers Mikko Laitinen and Hanna Sinkko in 2004 (Area U) Photo by Kirsi Valkama © KRP.

Appendix 4F Volunteers washing pottery during Horvat Kur excavations in 2013. Photo by Jaakko Haapanen © KRP.

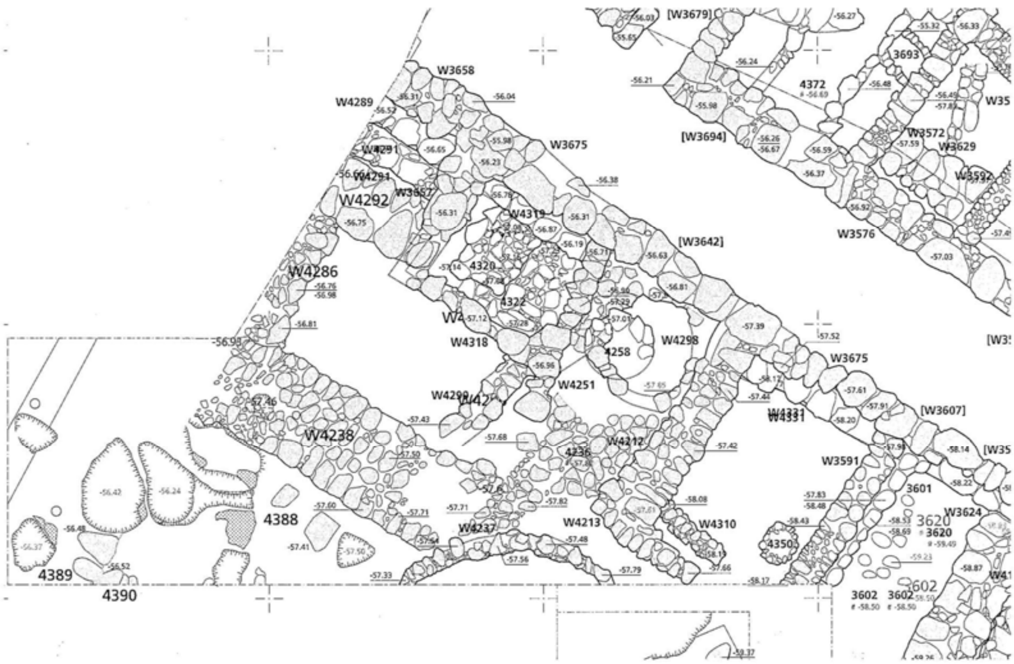
Appendix 4G Baskets with washed pottery in 1999, organized according to vessel parts. Photo by TT.

Appendix 4H Reading pottery in 2003. Photo by Merja Alanne, © KRP. Around the table: Kirsi Valkama, Merja Alanne, Virpi Holmqvist, Juhana Saukkonen, Juha Pakkala, Stefan Münger, Volkmar Fritz, who visited the campaign and Tuula Tynjä (with the laptop).



Appendix 4I. Areas N, R, S and U. Map by Axel Maurer, © KRP. The North arrow and marking of areas excavated by the KRP by TT.

Appendix 4J Map of area N, phase 3 (most extensive phase excavated), and the western corner of Area U on the lower left, map by Axel Maurer, © KRP

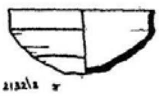


Appendix 4K Map of area U, phase 3 (most extensive phase excavated) and the eastern corner of area N on the upper right, map by Axel Maurer, © KRP.

Appendix 4L Restoring vessels from L4328: Israeli restorer Irina Guttman is looking for joining fragments. Photo by TT.

BEER-SHEBA, ... באר־שבע, OBJECT Bowl :החפץ

DRAWING ציור PHOTOGRAPH צילום



2132/2	No.	מספר
282	LOCUS	לוקוס
4.70	LEVEL	מפלס
	STRATUM	שכבה
1A	PERIOD	תקופה
B	TYPE	טיפוס
clay	MATERIAL	חומר
brown	CLAY	טין
brown	CORE	ליבה
white	GRITS, little	גריסים
	GRITS, big	חצצים
well fired	FIRING	צריפה
אובניים WHEEL / יד HAND	MAKE	עיבוד
wheel	BURNISH	מירוק
	SLIP	חיפוי
	DECOR.	עיטור
צילום PHOTO	DRAW	ציור

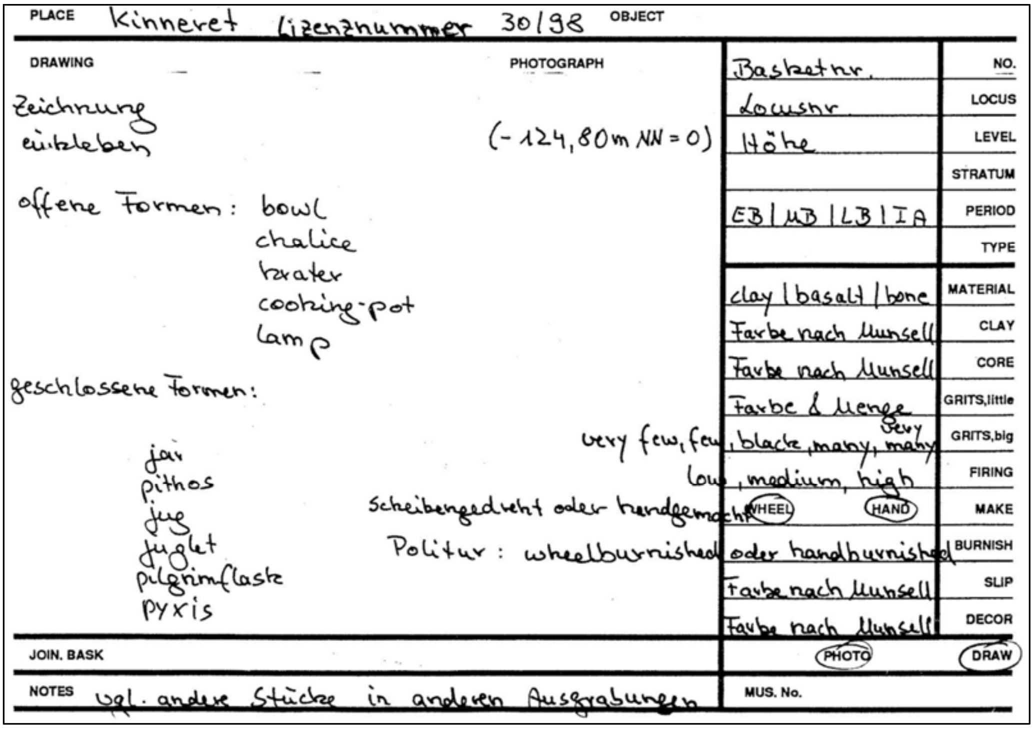
JOIN. BASK. :סלים מתחברים

NOTES :הערות

MUS. No. מוזיאון מס׳

Fig. 9. Form 9: Registration Card

Appendix 4M Find card-model from Beer-Sheba I, Aharoni et al. 1973: 132.


PLACE Kinneret Lizenznummer 30/98 OBJECT

DRAWING PHOTOGRAPH

Zeichnung einkleben

(-124,80m NN = 0)

offene Formen: bowl chalice krater cooking-pot lamp

geschlossene Formen: jar pithos jug juglet pilgrimflaske pyxis

Basketnr.	NO.
Locusnr.	LOCUS
Höhe	LEVEL
	STRATUM
EB / MB / LB / IA	PERIOD
	TYPE
clay / basalt / bone	MATERIAL
Farbe nach Munsell	CLAY
Farbe nach Munsell	CORE
Farbe & Menge	GRITS, little
very few, few, black, many, very many	GRITS, big
low, medium, high	FIRING
Scheibengedreht oder handgemacht: WHEEL HAND	MAKE
Politur: wheelburnished oder handburnished	BURNISH
Farbe nach Munsell	SLIP
Farbe nach Munsell	DECOR

JOIN. BASK PHOTO DRAW

NOTES vgl. andere Stücke in anderen Ausgrabungen MUS. No.

Appendix 4N Find card-model from Kinneret/Tel Kinrot in 1994–2001; example from1998.

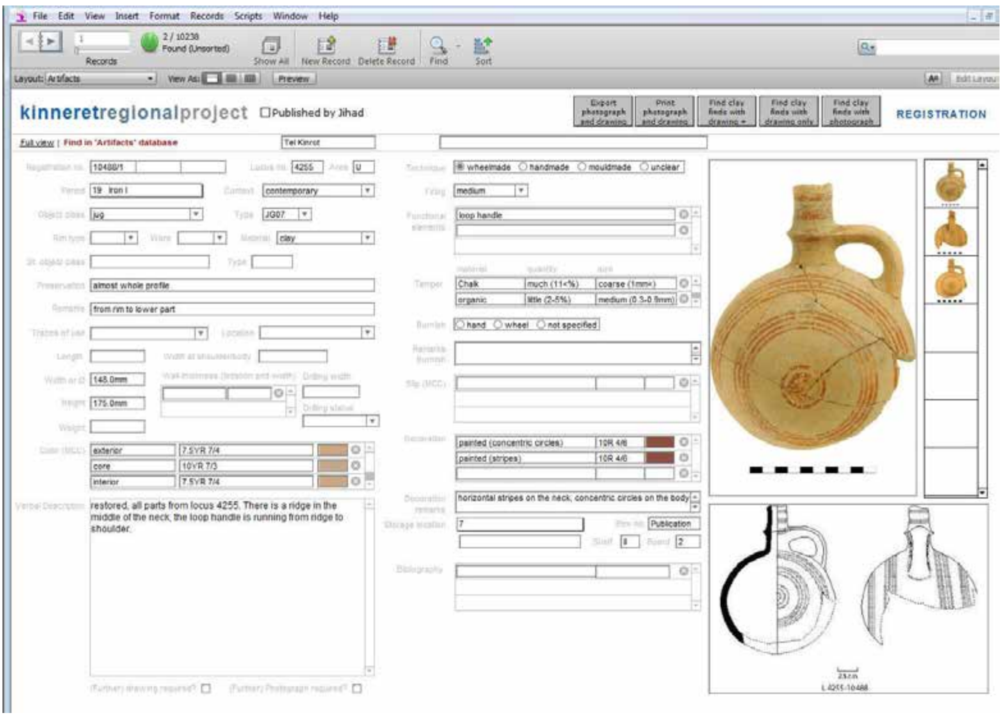
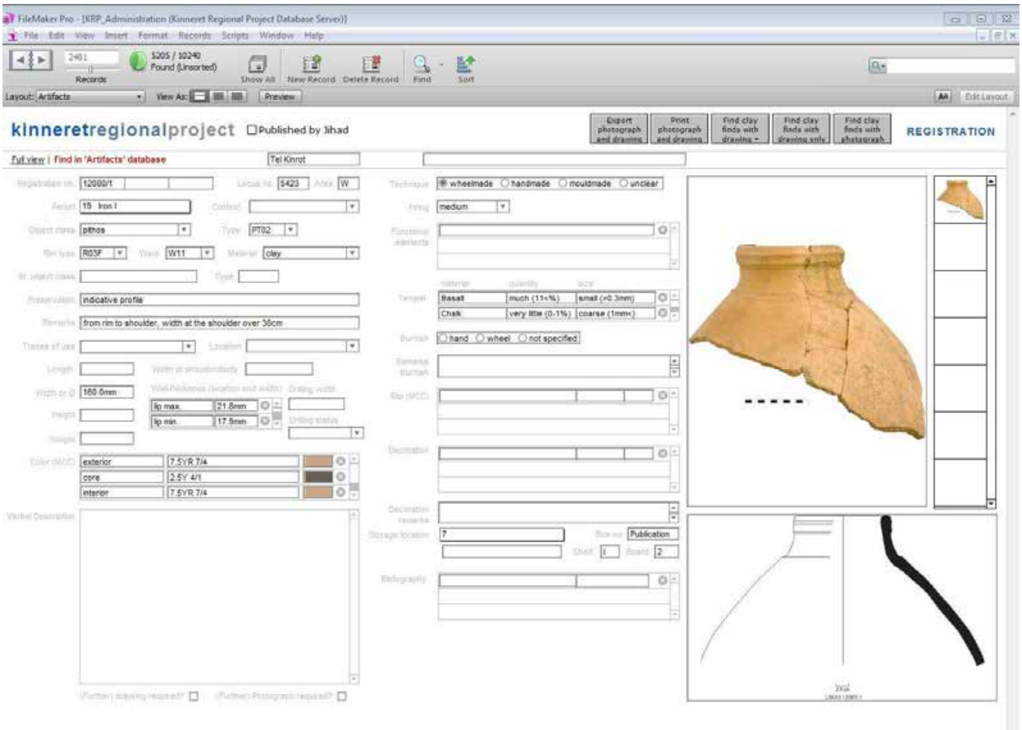
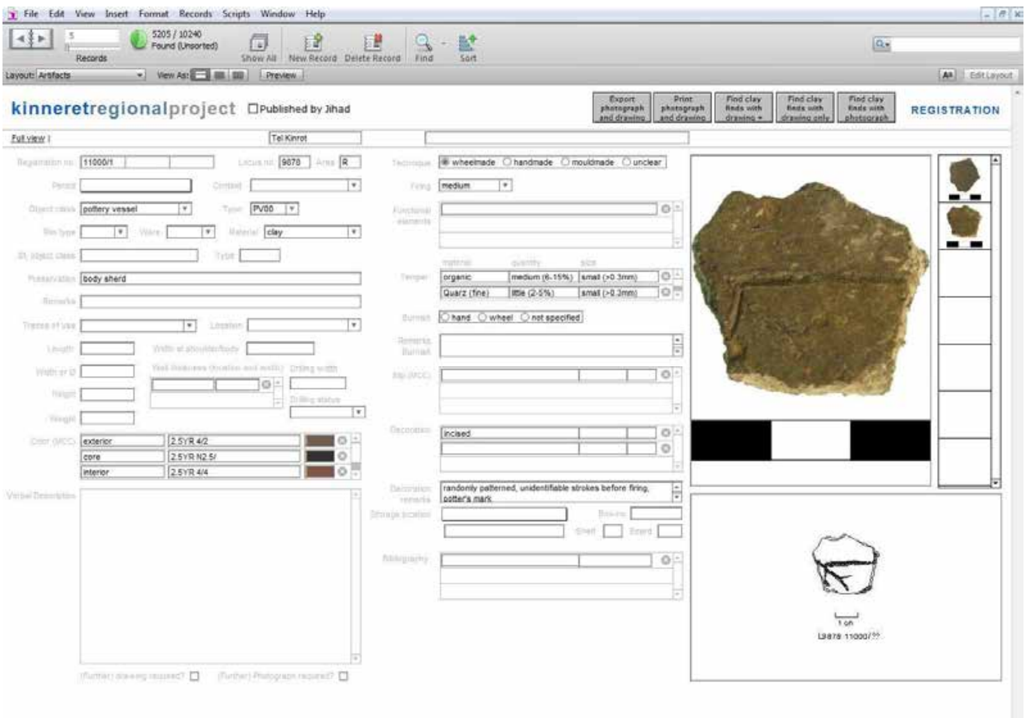


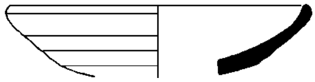
Fig.4O Snapshot from the FileMaker Pro database artifact layout of a jug from the same basket as App.4D1b and 4D3. Layout 2008.





Appendix 4P. Snapshots of the documentation lay-out for finds.

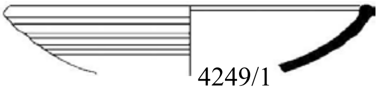
BL01 Shallow and Wide Rounded Bowls

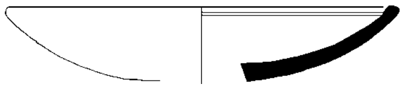

5829/11

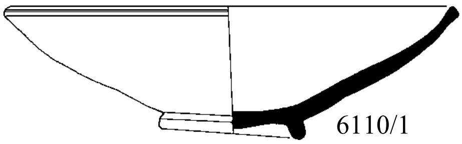

6112/1

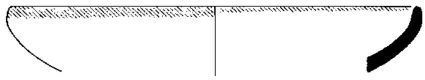

6146/12

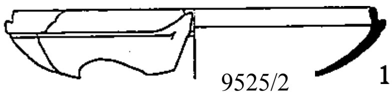

6274/1

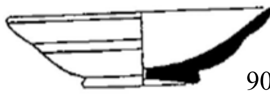

4249/1


4262/1


6110/1


7755/1 – L5281K

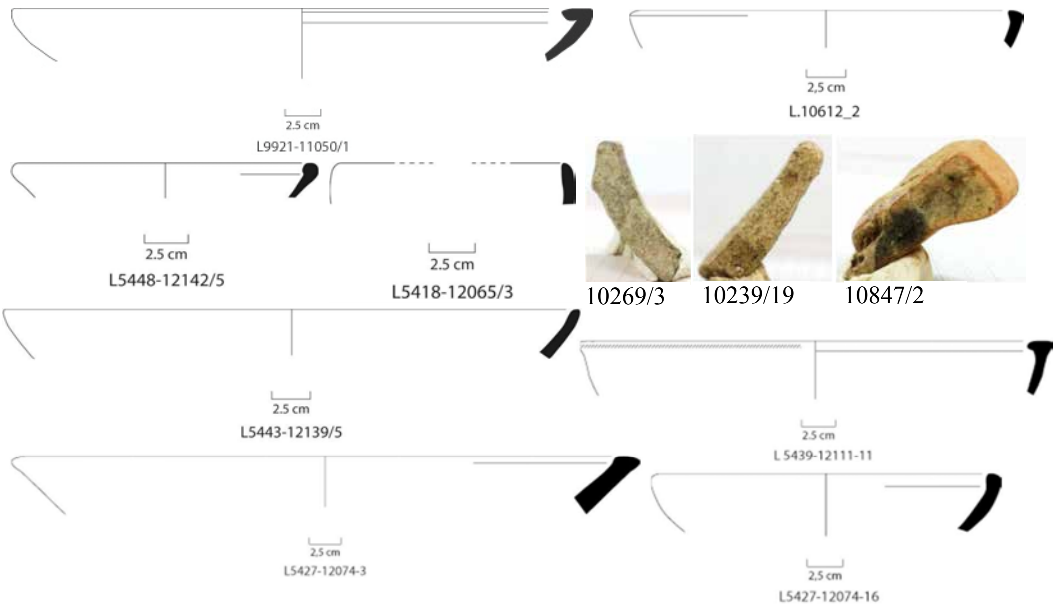

9525/2 1


9042/1

BL01 Shallow and Wide Rounded Bowls									
Reg. no	Locus	Area-phase/ Stratum	Rim	width/ height (cm)	Surface	main temper	second temper	color	pres.
5829/11	2915	G / VII-VI	simple rounded						2
6112/1	3041	H3 / VII	cut	30/ 8.7	-	dark minerals, much, coarse	chalk, medium, small and coarse	in: 10YR very pale brown 7/3 core: 10YR pale brown 6/3 out: 7.5YR light brown 6/4	2
6146/12	3041	H3 / VII	simple rounded	35/ 7.5–8	-	dark minerals, medium, small and coarse	chalk, medium, small and coarse	surface: 7.5YR pink 7/4 core: 10YR yellow 7/6	1-2
6274/1	3060	H	simple rounded	33/ 5–6.5	traces of pale slip	basalt, much, coarse and medium	chalk, little, coarse	surface: 7.5YR pink 7/4 core: 7.5YR light brown 6/4	2
4249/1	3114	H	simple rounded	28/ 5–6	-	basalt, much, medium	-	surface: 10YR white 8/2 core: 10YR white 8/2	1
4262/1	3123	H	thickened in, rounded	32/ 6–6.5	-	basalt, much, coarse	chalk, little, medium	surface: 2.5YR light red 6/6 core: filthy	1
6110/1	3032	H2 / VI	simple cut	36.5/ 10.5	hand-burnished on exterior	basalt, medium, small	sand, medium, medium and small	surface: 5YR reddish yellow 6/6	rest. 60%
9525/2	6188	R	cut, thickened inside	22/ 5–0	Red slip on rim and out below rim, grooved edge below rim outside	organic, medium, medium	Chalk, little, small	surface: 2.5YR light red 6/8 core: filthy slip: 10R red 5/6	1
7755/1	5281K	K3 / VI	simple rounded		red slip on rim				1
9042/1	6004	M1 / V	simple rounded	20/ 5	-	basalt, much, medium	chalk, very little, medium	surface: 7.5YR reddish yellow 7/6	2
pres.= preservation: 0=body shard, 1=rim shard; 2=larger fragment; 3=(almost) whole vessel/profile									

Appendix 5A Bowls

BL01 Shallow and Wide Rounded Bowls



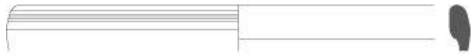
BL01 Shallow and Wide Rounded Bowls

Reg. no	Locus	Area-phase/ Stratum	Rim type	width (cm)	Surface	main temper	second temper	color	pres.
11050/1	9921	R	thickened in, ledge			few big brown grits	some big orange grits	out & core: 2.5YR light red 6/8; 7.5YR reddish yellow 7/6	1
10612/2	4301	U3B / V	R02B	25	-	chalk, little, medium	dark minerals, little, medium	surfaces: 5YR pink 7/4 core: 7.5YR brown 5/4	1
12142/5	5448	W1	R02	19	-	chalk, medium, medium	basalt, little, medium	out: 7.5YR pink 7/3; in: 7.5YR pink 7/4; core: 7.5YR brown 5/3	1
12065/3	5418	W2	R01C	28	-	basalt, much, medium	chalk, little, medium	surfaces: 2.5YR light red 6/6 core: 7.5YR light brown 6/4	1
12111/11	5439	W2	R02B	28	red slip: 10R red 4/6	basalt, little, medium	chalk, very little, medium	out: 7.5YR pink 7/4; in: 5YR pink 7/4; core: 10YR grayish brown 5/2	1
12139/5	5443	W2	R01C	25	-	basalt, little, medium	quartz, medium, small	out: 5YR reddish brown 5/3; in: 2.5YR reddish brown 5/3; core: 10YR dark gray 4/1	1
10269/3	4225	U3B	R03B	27	-	basalt, much, medium	chalk, medium, medium	out: 10YR 8/3; in: 5YR 7/6 core: 10YR 5/3	1
10239/19	4218	U3B/ V	R0 simple	29	-	basalt, much, medium	chalk, little, small	surfaces: 7.5YR pink 7/4 core: 7.5YR pink 7/4	1
10847/2	4343	U3B/ V	R01B	31	-	basalt, much, medium	chalk, little, coarse	surfaces: 5YR pink 7/4 core: 7.5YR light brown 6/4	1
11200/7	9969	R	2B	28		basalt, medium, small	chalk, little, coarse	out: 2.5YR light red-brown 6/4; in: 5YR 7/4; core: 10YR brown 5/3	1
12074/3	5427	W3	R02	45	-	basalt, much, medium	chalk, little, medium	surfaces: 5YR pink 7/4 core: 2.5Y light brownish gray 6/2	1
12074/16	5427	W3	R02	25		basalt , much, medium	chalk, little, coarse	surfaces: 10YR 8/3 core: 7.5YR 5/3	1
11134/1	9931	R		28		basalt, much, medium	chalk, medium, coarse	surfaces: 5YR reddish yellow 7/6; core: 10YR gray 5/1	1
10349/1	4246	U0	R0	28		chalk, much, coarse	basalt, little, coarse	out: 2.5Y pale yellow 8/2; in: 5Y light gray 7/1; core: 10YR very pale brown 7/3	1
11027/6	9878	R			grooved rim, drawing is too upright	sand, little, small	-	surfaces & core: 2.5YR red 5/6	1

BL01 Shallow and Wide Rounded Bowls

2.5 cm
L 9969-11200/7

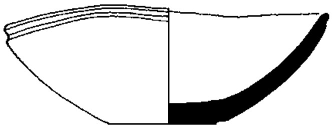
2.5 cm
L9878-11027/6



2.5 cm
L9931-11134/1

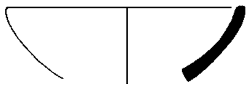
2.5 cm
L4246-10349/1

BL02A Small Rounded Bowls with Simple rim

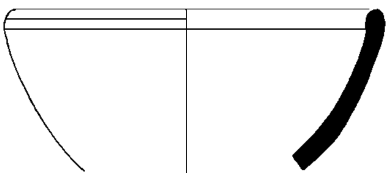


5379/1

8498/1

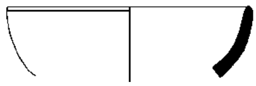


7404/1

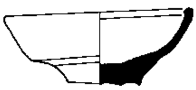


6116/2

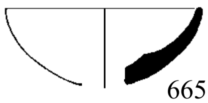
7623/3



4268/1



5161/3



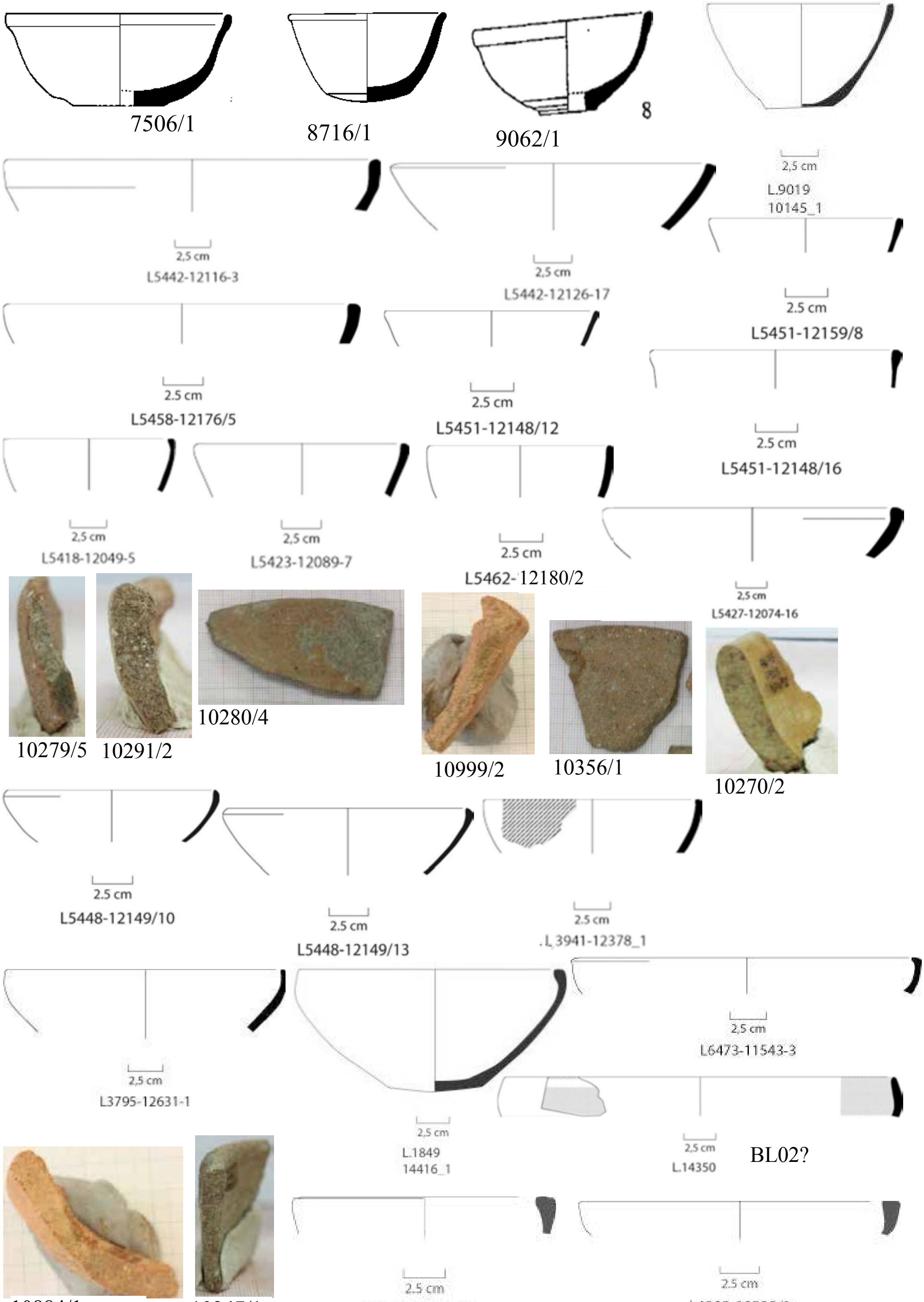
6650/1

BL02A Small Rounded Bowls with Simple Rim

Reg. no	Locus	Area-phase/ Stratum	Rim	width/ height (cm)	Surface	main temper	second temper	color	pres.
5379/1	2140	G4 / VII	simple cut	24–26/ 8.7	-	organic, much, coarse	chalk, much, coarse and medium	7.5YR reddish yellow 6/8	restored 90 %
8498/1	5103	K / V	simple rounded	20/ 7.2	-	basalt, much, medium	chalk, medium, medium	surface: 10YR very pale brown 8/4 core: 10YR very pale brown 7/4	restored 90–95%
7404/1	4162	J1/ V	simple rounded	18/ 5.5–6	traces of fire inside	basalt, much, small	chalk, little, medium	surface: 5YR reddish yellow 7/6	1
6116/2	3038	H2 / VI	rounded, thickened in	28/ 14–17	traces of red slip out and on the rim	chalk, medium, coarse	basalt, medium, small and coarse	2.5YR light red 6/6	from rim to body
7623/3	5261K	K	simple rounded	22/ 9–10	-	basalt, much, medium	chalk, little, small	10YR yellow 7/6	from rim to body
4268/1	3123	H	rounded, thinned	15/ 5–6	-	basalt, much, small	-	surfaces: 7.5YR pinkish white 8/2 core: 7.5YR pinkish white 8/2	1
5161/3	2050	G2 / V	cut, thickened in	12/ 4.5–5.5	traces of fire in, unworked base	basalt, much, medium	chalk, medium, coarse and medium	surface: 5YR reddish yellow 7/8 core:10YR gray 5/1	75–85 %
6650/1	3609	N1 / V	simple rounded	14/ 5	traces of fire in and out	basalt, medium, small	chalk, little, small	out: 10YR pale brown 6/3; in: 10YR dark grayish brown 4/2; core: 10YR dark gray 4/1	from rim to base

Small Rounded Bowls with Simple Rim BL02A (cont.)									
Reg. no	Locus	Area-phase/ Stratum	Rim	width/ height (cm)	remarks	main temper	second temper	color	preserv.
7506/1	5131	K2/V	rounded, thickened out	13/ 6.7	base unworked	basalt, much, small	chalk, medium, coarse	7.5YR pink 7/4	from rim to base
8716/1	5042	K2/V	rounded everted	12/ 6.3	-	basalt, much, small	chalk, little, medium	surfaces: 5YR reddish yellow 7/6 core: 10YR light brownish gray 6/2	from rim to base
9062/1	6001	M1/V	rounded simple	13/ 7	-	basalt, much, small	chalk, little, coarse	2.5YR light red 6/6	from rim to base
10145/1	9019			12		basalt, much, small	chalk, much, medium	out: 10YR yellow 7/6; in: 7.5YR 7/6; core: 7.5YR light brown 6/4	restored whole
12116/3	5442	W4	R01	22	-	basalt, medium, small	quartz , little, small	out: 7.5YR 7/4; in: 5YR 7/4 core: 10YR 6/4	rim shard
12126/17	5442	W4	R00	18	-	basalt, medium, small	chalk, medium, coarse	surfaces: 5YR 7/4 core: 7.5YR 6/4	rim shard
12176/5	5458	W2	R01	18	-	basalt, little, medium	quartz , little, small	surfaces: 7.5YR 7/4 core: 7.5YR 6/4	rim shard
12148/12	5451	W2	R01	13	-	basalt, medium , small	quartz , little, medium	out: 5YR 7/3; in: 5YR 6/3 core: 2.5YR 5/4	rim shard
12148/16	5451	W2	R06L	25	-	quartz, much , coarse	basalt, very little, medium	surfaces: 2.5YR 5/4 core: 2.5YR 4/4	rim shard
12159/8	5451	W2	R00	12	-	basalt, medium, small	chalk, little, coarse	out: 2.5YR 6/6; in: 5YR 6/6 core: 10YR 5/3	rim shard
12089/7	5423	W2	R02	15	-	basalt, much, small	chalk, little, coarse	out: 7.5YR 7/4; in: 10YR 7/2 core: 10YR 5/2	rim shard
12049/5	5418	W2	R03C	13	-	basalt, medium , medium	chalk, little, medium	out: 7.5YR 7/4; in: 7.5YR 7/6 core: 5YR 6/4	rim shard
12180/2	5462	W2	R01	10	-	basalt, much , coarse	chalk, medium, coarse	out: 5YR 7/6; in: 2.5YR 6/6 core: 10YR 6/3	rim shard
12149/10	5448	W1	R03C	13	-	basalt, medium , medium	chalk, little, coarse	out: 2.5Y pale yellow 8/2; in: 7.5YR pink 7/4; 7.5YR brown 5/2	2
12149/13	5448	W1	same as	above	same	bowl?			
10279/5	4225	U3B	R01C	14	-	basalt, much , small	chalk, medium, medium	surfaces: 2.5YR 6/6 core: 10YR 5/3	1
10269/3	4225	U3B	R03B	27	BL01?	basalt, much, medium	chalk, medium, medium	out: 10YR 8/3; in: 5YR 7/6 core: 10YR 5/3	1
10291/2	4225	U3B	R02	14	-	basalt, much , small	chalk, little, coarse	out: 10YR 7/3; in: 5YR 7/4 core: 7.5YR 6/4	1
10280/4	4227	U3B	R01	12	-	basalt, much, small	chalk, little, medium	out: 5YR 6/6; in: 5YR 7/6 core: 7.5YR 6/4	1
10999/2	4356	U3B	R02B	14	-	basalt, much , small	chalk, little, medium	out: 2.5YR 5/6; in: 2.5YR 6/6 core: 10YR 4/1	1
10356/1	4282	U3A	R03I	16	-	basalt, much, small	chalk, little, coarse	out: 2.5YR 6/4; in: 2.5YR 6/6 core: 10YR 6/4	1
12378/1	3941	S		15	red 10R 4/6 slip in & out	sand, little, small	quartz, little, small	surfaces: 5YR pink 7/4; core: 5YR reddish brown 5/4	1
12631/1	3795	S		18		basalt, much, small	quartz, little, medium	out: 5YR 6/4; in: 5YR 6/6; core: 7.5YR 5/4	1
14416/1	1849	S		20		basalt, little, medium	-	out: 5YR 6/6; in: 5YR 6/8; core: 7.5YR 6/4	rest. whole
14350/2	1832	S			red slip			surfaces: 5YR 5/6; slip: 5YR 4/4	1
11543/3	6473	R		19		basalt, medium, small	chalk, very little, medium	-	1
10247/1	4210	U1	R01	12		basalt , much, medium	chalk, medium, medium	out: 5YR 7/4; in: 7.5YR 7/4 core: 5YR 6/4	rim shard
10216/5	4202	U0	R02FR	13	-	sand, much, coarse	quartz, medium, medium	out: 2.5YR 6/4; in: 2.5YR 6/6 core: 7.5YR N4/	rim shard
10229/1	4203	U0	R02B	14	-	basalt , medium, medium	chalk, little, coarse	10YR 8/3; in: 10YR 6/8 core: 10YR 5/1	rim shard
10884/1	4345	N0	R02		-	basalt, much , small	chalk, medium, coarse	surfaces: 2.5YR 6/6 core: 7.5YR 5/4	rim shard

BL02A Small Rounded Bowls with Simple rim



7506/1

8716/1

9062/1

L.9019
10145_1

L5442-12116-3

L5442-12126-17

L5451-12159/8

L5458-12176/5

L5451-12148/12

L5451-12148/16

L5418-12049-5

L5423-12089-7

L5462-12180/2

L5427-12074-16

10279/5

10291/2

10280/4

10999/2

10356/1

10270/2

L5448-12149/10

L5448-12149/13

L 3941-12378_1

L6473-11543-3

L3795-12631-1

L.1849
14416_1

L.14350

BL02?

10884/1

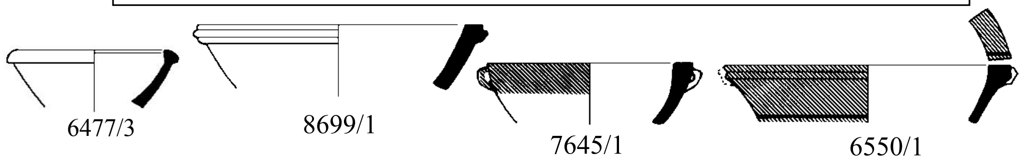
10247/1

L4202-10216/5

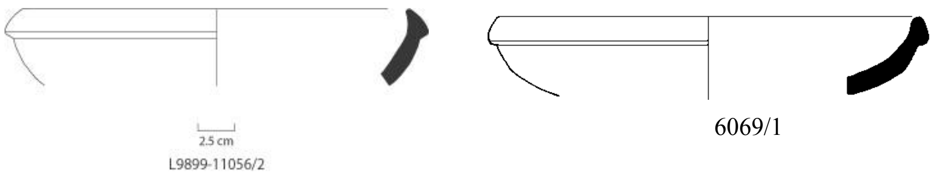
L4203-10229/1

Appendix 5A Bowls

BL02A Variations of Small Rounded Bowls with Modeled Rims



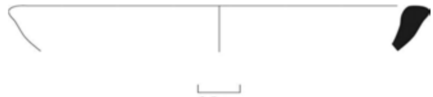
BL02B Wide Rounded Bowls with Thick Ledge Rim



Variations of Small Rounded Bowls with Simple Rim BL02A									
Reg. no	Locus	Area-phase/ Stratum	Rim	width/ height (cm)	Surface	main temper	second temper	color	pres.
6477/3	3531	N2 /Str. VI	ledge	10–13/ 4–6		basalt, much, small	chalk, little, medium	surfaces: 5YR reddish yellow 7/6 core: 5YR reddish yellow 6/6	1
8699/1	5237	K /Str. V	cut, flat	20/ 7.2	traces of red slip, grooved ledge below the lip	basalt, medium, small	organic, little, medium	surfaces: 7.5YR reddish yellow 7/6 core: 10YR very pale brown 7/4 slip: 2.5YR red 5/8	1
7645/1	5257 K	K / Str. V	cut, flat	22/ 6–9	traces of slip on rim and on the upper part out; bar handle with knob	basalt, much, small	chalk, medium, small	surface: 7.5YR reddish yellow 7/6 slip:10R red 5/8	1
6550/1	3568	N	cut, flat	20/ 6–8	red slip on rim and outside on upper part; bar handle	basalt, much, small	-	clay: 10YR very pale brown 7/4 slip: 2.5YR red 4/8	1
BL02B Wide Rounded Bowls with Thick Ledge Rim									
11056/2	9899	R VII	6H	26	burnish out	Organic, much, coarse	Sand, medium, medium	out: 7.5YR 7/4; in: 5YR 7/6; core: 10YR 5/4	
6069/1	3018	H2 (fill of VI)	6H	28	Burnish out	Organic, much, medium	Basalt, medium, small	surface: 7.5YR reddish yellow 7/6; core: 7.5YR dark grey N4	1
12073/13	5423	W2	3H	27	red slip out 2.5YR 5/6	Basalt, medium, coarse	dark minerals, little, coarse	out: 5YR 6/6; in: 5YR 7/6 core: 2.5YR 5/1	1
12139/11	5442	W2	02	20	-	Basalt, little, medium	chalk, little, small	out: 5YR 7/4; in: 2.5YR 6/3 core: 10YR 5/2	1
10239/17	4218	U3B	4B	21	White slip out color 10YR 8/2	Organic, little, small	Sand, little, small	surfaces:10YR 8/4 core: 2.5Y N5/	2
10267/3	4207	U2	3H	21	red slip out 5YR 6/4	organic, medium, small	chalk, little, medium	out: 2.5YR 6/6; in: 5YR 6/4 core: 10YR 6/2	1
6016/27	3008	H0	6H	30	Burnish in & on rim	Organic, much, medium	Basalt, medium, small	surface: 5YR reddish yellow 7/6 core: 2.5YR gray N6	1
10256/4	4217	U0	3C	18	Red slip on rim color: 10R 5/8	Sand, little, small	-	surfaces: 7.5YR 7/4 core: 10YR 6/3	1
4052/1	1217	E1/ post IV	2B	24	Red slip in & out: 7.5YR pinkish gray 6/2	Chalk, medium, medium	Basalt, medium, small	surface and core: 10YR very pale brown 7/3	1

BL02B Wide Rounded Bowls with Thick Ledge Rim

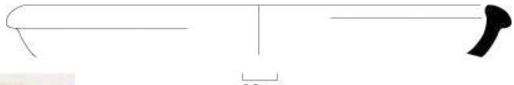
2.5 cm
L5423-12073/13



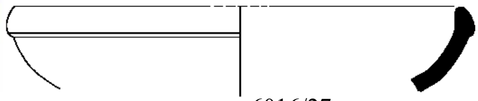
2.5 cm
L5443-12139/11

10239/17

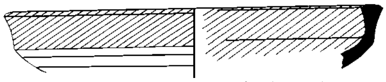
10256/4 (side and back)



2,5 cm
L4207-10267-3

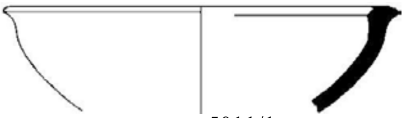


6016/27

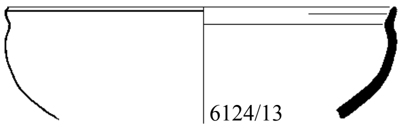


4052/1 (IA II)

BL02C Rounded Bowls with Everted rim

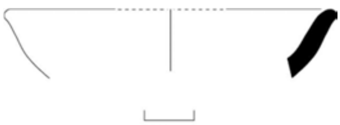


5011/1

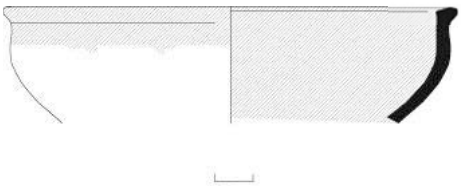


6124/13

8618/3



2,5 cm
L.6417
11250_6



2.5 cm
L 5415-12078/2

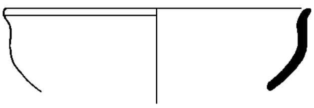
BL02C Rounded bowls with modeled, S-shaped rim									
Reg no	Locus	Area-phase	wall mm	rim	width cm	Surface	main temper	second temper	color
5011/1	2003	G0	8-9	4	26	-	organic, little, medium	chalk, little medium	surface: 5YR 4/6; core: 10YR 5/3
6124/13	3043	H2 / VI fill	9	5E	26	-	basalt, much, medium	chalk, much, small & coarse	surface: 5YR 7/4; core: 10YR 7/2
8618/3	5202	K1 /V	10	5E	25	red slip in & out	chalk, little, medium & c.	sand, medium, medium	surface: 5YR 7/6; core: 10YR 5/1
11250/6	6417	R		5A			basalt, very little, small	chalk, medium, medium	surfaces: 5YR 7/6; core: 7.5YR 6/4
10896/12	4348	N	7	3C	15	white slip 10YR 8/2; gray 10YR 4/1 stripe on rim	basalt, medium, medium	chalk, little, medium	out: 7.5YR 7/3; in: 10YR 8/3; core: 10YR 7/2

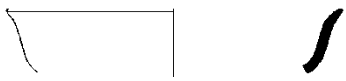
Appendix 5A Bowls

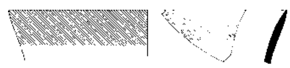
BL03 Small rounded bowls of fine ware

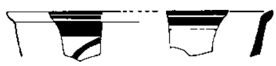
Reg no	Locus	phase	wall (mm)	Rim	Diam (mm)	Surface	main temper	second temper	colour
6091/15	3023	H0	5	5E	200	wheel burnished	basalt, medium, small	chalk, medium, small	surface: 7.5YR reddish yellow 7/6; core: 7.5YR pink 7/4
7747/2	5281K	K-VI	4	5E	200	Pale slip (10YR 8/4), burnish in & out	chalk, little, small	sand, little, small	surface & core: 7.5YR pink 7/4
7726/1	5281K	K-VI	4	5E	200	pale slip (10YR 8/4), red painted decoration	basalt, little, small	sand, little, small	surface: 10YR white 8/2 core: 7.5YR light brown 6/4
7680/2	5269K	K-V	2-3	5E	120	burnish, dark brown decoration (7.5YR 3/2)	no temper	-	surface & core: 10YR yellow 7/6
8216/8	5027	K-V	2-3	5E	200	white slip (10YR 8/2)	organic, medium, small	chalk, little, small	surface & core: 7.5YR reddish yellow 7/6
9010/1	6003	M-1	2-3	5E	230	white slip 10YR 8/2 & burnish	sand, little, small	-	surface & core: 10YR white 8/2
9544/1	6185	R1-V	3-4	5E	110	white slip 10YR 8/2, brown painted decoration, burnish	sand, little, small	-	surface & core: 7.5YR pink 7/4
5819/2	**2912**	G						-	
5650/1	2222	preQ2	4	5E	210	white slip (10YR 8/2) & burnish	sand, little, small & medium	-	surface & core: 10YR very pale brown 8/3
5562/1	2211	Q-0	5-6	5E	230	Pale slip (10YR 8/3), brown painted decoration	sand, little, small	-	surface: 7.5YR reddish yellow 7/6; core: 5YR yellowish red 5/6
5096/11	**2047**	**G2-V**	4–5	5AB	**135**	grey decoration	sand, little, small	-	surface: 10YR very pale brown 8/3; core: 10YR gray 5/1

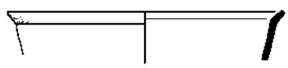
BL03 Fine Ware Bowls


6091/15


7747/2


7726/1

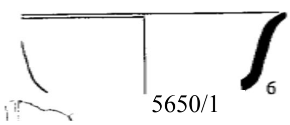

7680/2


8216/8


9010/ 1


9544/1


5819/2

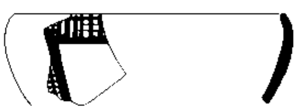


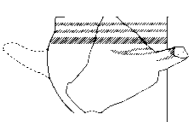
5650/1

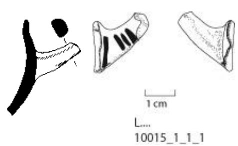

5562/1 (scale?)

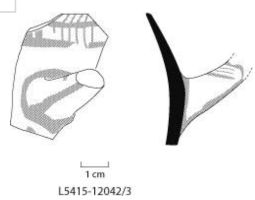

5096/11

Cypriote white-slip-ware bowls (6605/1, 8042, 9241/1, 10015/1 and 12042/3), as well as fine ware bowl shards 6414/1, 4286/1–2, 7368/12, 7841/10, 8464/12, 8480/7, 8555/1, 8559/1, 8716/2 are, analyzed in detail in Kinneret II, Vol.II.

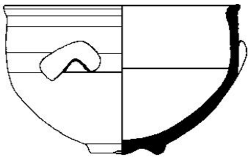

6605/1


8042/1

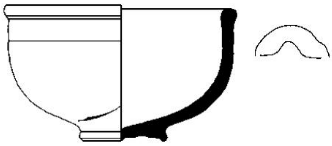




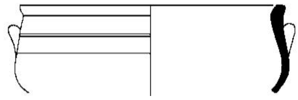
BL04A Bell Shaped Bowls



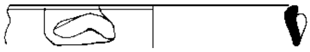
4432/1



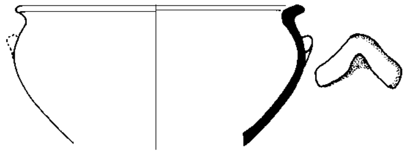
6761/1



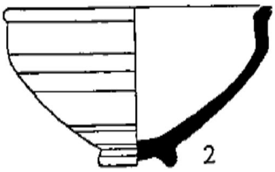
6761/2



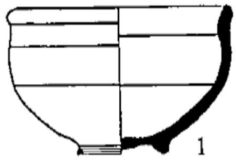
6881/1



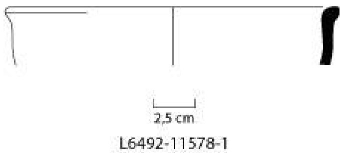
7785/4

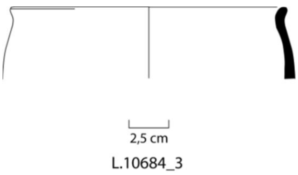


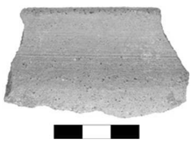
9560/1



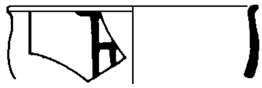
9596/1







10410/6



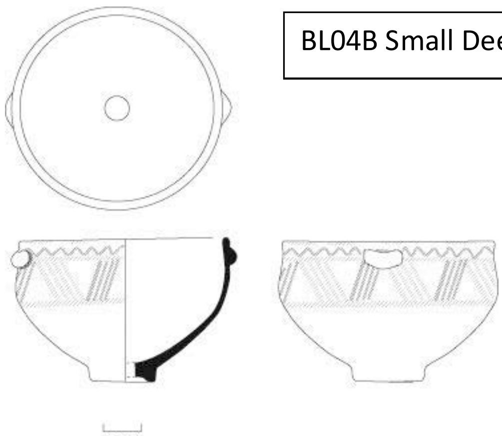
6091/16

BL04A Bell Shaped Bowls

reg. no	Locus	phase	width	height	wall	rim	rim	features	main temper	second temper	colour
4432/1	3144	H2	180	110	-	-	-	handle	basalt, much, medium	chalk, little, small	surface: 10YR white 8/2; core: 7.5YR pink 8/4
6761/1	3656	N1-V	170	10	-	-	5AB	-	basalt, much, medium	chalk, little, coarse	surfaces & core: 7.5YR pink 8/4
6761/2	3656	N1-V	170	90	-	-	5A	handle	basalt, much, medium	chalk, little, medium	surface: 5YR reddish yellow 7/6 core: 7.5YR pink 7/4
6881/1	3676	N1-V	200	-	-	-	5AB	handle	basalt, much, small	chalk, little, small	surface: 5YR reddish yellow 7/6
7785/4	5300	K VA	210	c.120	-	-	5F	handle	basalt, much, medium	chalk, med, coarse	surfaces: 7.5YR reddish yellow 7/6; core: 10YR light brownish gray 6/2
9560/1	6194	RV	185	105	-	-	5F	-	basalt, much, small	chalk, medium, coarse	surface: 10YR yellow 8/6 core: 10YR light brownish gray 6/2
9596/1	6178	RV	160	100	-	-	5A	-	basalt, medium, small	chalk, little, medium	surface: 5YR reddish yellow 7/8; core: 7.5YR reddish yellow 8/6
6091/16	3023	H0	200	75	4-5	-	5A	red dec. 5YR 5/2	chalk, much, small	dark minerals, med, small	surfaces & core: 2.5Y white 8/2
10410/6	4269	U3B	220	-	6.4	10.3	2B	-	basalt, much, medium	quartz, little, medium	out: 5YR 7/4; in: 5YR 6/4 core: 5YR 5/2
10684/3	4312	U3B	150	-	7.5	8.3	5AB		organic, little, small	quartz, little, medium	out: 5YR 5/4; in: 5YR 6/4 core: 5YR 4/3

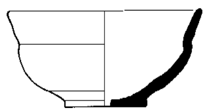
Appendix 5A Bowls

BL04B Small Deep Bowl with Handles on Rim

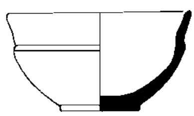


L5409-12030/1

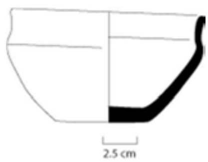
BL06 LB II-Style Carinated Bowls



7580/1



7580/2

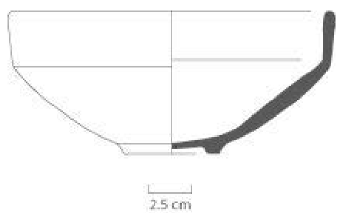


L 5439-12111_37

12111/37

BL07A Carinated Bowls with Uprigh Upper Part

10310/6 (2 views)



L4207-10260/1

BL04B Small Deep Bowl with Handles on Rim

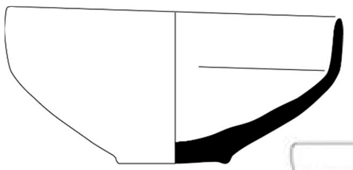
reg. no	Locus	phase	width	height	rim	remarks	main temper	second temper	color
12030/1	5409	W0	13	9.5	02	knob hanles, drilled hole in base; red 2.5YR 5/6 and black 7.5YR N3 stripes and zigzags	chalk, little, coarse	dark minerals, little, coarse	surfaces: 5YR 7/4 core: 5YR 6/6

BL06 LBII-style Carinated Bowls

Reg no	Locus	phase	Rim	Diam (cm)	height cm	main temper	second temper	color
7580/1	5163	K2/Str.V	*	12	7.5	basalt, much, small	chalk, medium, medium	surface & core: 10YR yellow 7/6
7580/2	5163	K2/Str.V	*	16	7.8	basalt, much, small	chalk, medium, medium	surface: 5YR reddish yellow 7/6 core: 10YR light gray 7/2
12111/37	5439	W2	5A	13		basalt, much, medium	chalk, little, coarse	out: 7.5YR 6/4; in: 2.5YR 7/6 core: 7.5YR 5/3

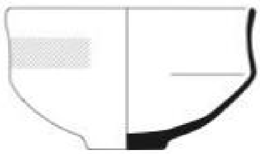
*Rim 5E: Everted, simple, thinned rim, but these bowls only have *slightly* tinned rim and thus are close to rim 5A (Everted, simple rim).

BL07A Carinated Bowls with Uprigh Upper Part (cont.)

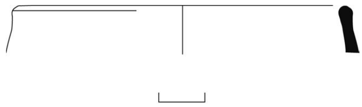


2,5 cm
L.4265
10408_1

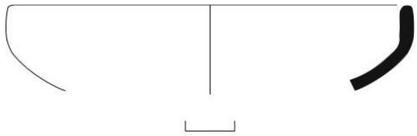
10220/3



2,5 cm
L.1849
14417_1

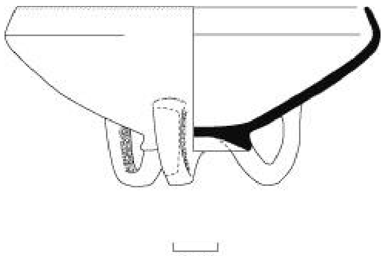


2.5 cm
L5443-12139/10



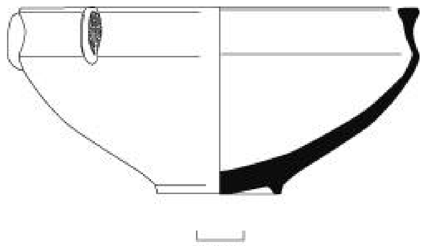
2,5 cm
14352/8

BL07B Carinated Bowl with Loop Feet



2.5 cm
L5402-12024/1

BL07C Carinated Bowl with Thick, Flat Rim



2.5 cm
L4269-10433/1

BL07A Carinated Bowls with Upright Upper part								
Reg no	Locus	phase	Rim	Diam (mm)	Surface, details	main temper	second temper	color
10310/6	4236	U3B	2B	210	-	basalt, much, medium	chalk, little, coarse	out: 5YR 7/4; in: 5YR 6/6 core: 10YR 4/3
10260/1	4207	U2	01	180	-, narrow ring base	basalt, much, coarse	Chalk, medium, coarse	surfaces & core: 5YR 6/6
10408/1	4269	U0/U3	02	180	narrow ring base	basalt, much, small	chalk, little, medium	surfaces: 5YR 5/6 core: 7.5YR 7/4
10220/3	4207	U2	02	180	narrow ring base	basalt, much, coarse	chalk, medium, coarse	surfaces: 5YR 6/6 core: 5YR 5/4
10481/7	4255	U0	2B	240	not illustrated	basalt, much, small	chalk, little, coarse	out: 7.5YR 7/4; in: 2.5YR 6/6 core: 2.5Y N5/
12139/10	5443	W2	6G3	170	–	basalt, little, small	chalk, little, M	out: 10YR 8/4; in: 7.5YR 8/4 core: 7.5YR 7/4
14417/1	1849	S	01	130	disc base, red 5YR 4/6 band	sand, very little, small	chalk, little, coarse	surfaces: 7.5YR 6/4
14352/8	1834	S		160		basalt, little, medium	chalk, very little, medium	surfaces: 5YR yellowish red 5/6
BL07B Carinated Bowl with Loop Feet								
12024/1	5402	W0	6D	200	red 2.5YR 4/4 stripe on rim	basalt, medium, small	chalk, little, small	out:7.5YR 6/4; in: 7.5YR 5/2 core: 7.5YR 5/4
BL07C Carinated Bowl with Thick, Flat Rim								
10433/1	4269	U0/U3	02	220	knob handles on rim	basalt, much, small	chalk, medium, medium	out: 5YR 6/6; in: 7.5YR 7/6 core: 5YR 4/2

Appendix 5A Bowls

BL08A Cup-Bowls with Inverted Upper Part

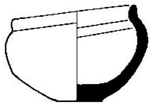
Reg no	Locus	phase	Rim type	Rim width mm	height mm	Surface, details	main temper	second temper	color
5379/2	2140	G4/ Str. VII	5A	89	65–70		organic, much, medium	chalk, little, medium	5YR yellowish red 5/8
5062/30	2026a	G3/ Str. VI	5E	70	50–60	black stripes 2.5YR N5	chalk, little, coarse	sand, little, small	surface: 10R light red 6/8; core: 10YR gray 5/1
6020/2	3008	H	5L	95	65–70	hand-burnished	organic, much, medium	dark minerals, little, small	surface: 5YR reddish yellow 5/8; core:10YR light brownish gray 6/2
6172/8	3041	H3/ Str. VII	5A	160	>80	grooved below lip	organic, little, medium	sand, little, small	surface: 2.5YR light red 6/6; core: 7.5YR pink 7/4
6319/4	3065	H3/ Str. VII	5A	60	40		chalk, much, medium & small	sand, little, small	surface: 2.5YR reddish brown 5/4; core: 2.5 YR very dark gray N3
6104/18	3040	H3/ Str. VII	5A	80	55–65		chalk, medium, medium	dark minerals, medium, medium	surface: 5YR pink 7/4; core: 5YR light reddish brown 6/4
9538/1	6188	R	5A	80	50–60		organic, medium, medium	chalk, little, small	surface: 5YR reddish yellow 7/6; core: 7.5YR pink 7/4
9538/2	6188	R	5AB	100	60–65	wheel burnished	organic, medium, medium	chalk, little, small	surface: 7.5YR reddish yellow 7/6; core: 7.5YR dark gray N4
9561/1	6195	R	5A	80	65–75	spouted	dark minerals, little, small	chalk, little, small	surface: 2.5YR light red 6/6; core: 5YR reddish yellow 7/6
11056/30	9899	R	5A	90	>60	red 10R 4/8 slip	organic, medium, medium	chalk, much, medium	surfaces: 5YR reddish yellow 7/6; core: 7.5YR light brown 6/4
9759/1	W6253	R0	5E	120		red 10R 4/6 slip out	organic, medium, medium	few big gray grits	out: 7.5YR 7/4; in: 7.5YR 6/6; core: 10YR 6/3

BL08B Carinated Bowls with Inverted Upper Part

Reg no	Locus	phase	Rim	rim width	height mm	Surface, details	main temper	second temper	color
6149/1	3043	H2/ Str. VI	5E	160	80–90	brown slip in, red slip out & hand burnishing	no temper	-	surface: 7.5YR pink 7/4; slip out: 2.5YR red 5/6; slip in 7.5YR brown 5/2
6445/1	3511	N1/ Str.V	5A	180	75–85		basalt, much, small	chalk, little, small	surface: 10YR very pale brown 8/3
5816/3	2901		5A						
10566/6	4303	U3A	4	150	>50	-	basalt, much, medium	quartz, little, medium	out: 7.5YR 6/4; in: 7.5YR 7/4; core: 7.5YR 5/3
11056/32	9899	R		150	>50		organic, medium, medium	chalk, medium, medium	out: 5YR 7/4; in: 10YR very pale brown 7/4; core: 10YR very dark gray 3/1

Rim 5A: Everted, simple (rounded); Rim 5AB: everted, thickened outside; Rim 5E: everted, thinned; Rim 5L Everted, thickened inside

BL08A Cup-Bowls with Inverted Upper part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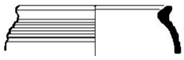
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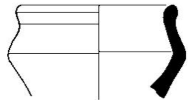
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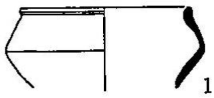
6104/18



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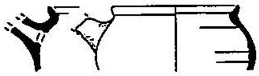
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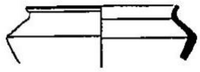
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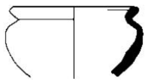
5062/30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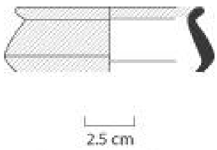
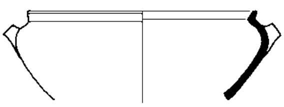


L9899-11056/30

BL08B Carinated Bowls with Inverted Upper Part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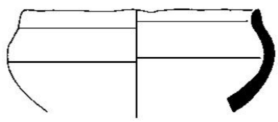
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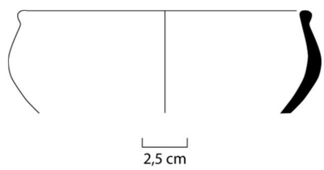

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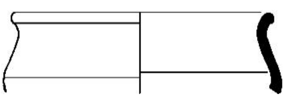
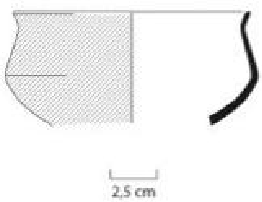

5816/3



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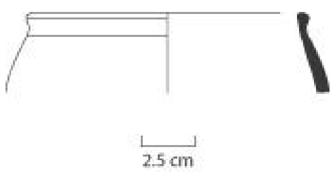
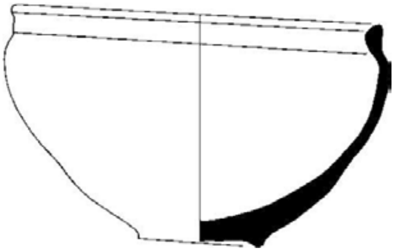


L9899-11056/32

Appendix 5A Bowls

BL09A Cyma Profiled Bowls									
Reg. no	Locus	phase	Rim	Rim width	height mm	Surface, details	main temper	second temper	color
6451/1	3515	N2-VI	5AB	250	152	ring base	basalt, much, small	chalk, little, medium	surface: 10YR yellow 7/6; core: 10YR very pale brown7/3
6866/1	3676	N1-V	5A	400	150	-	basalt, much, small	chalk, little, medium	surface: 5YR pink 7/3; core: 5YR reddish yellow 6/6
8207/1	5027	K2-V	5A	240	180	ring base	bas, much, small-medium	chalk, little, medium	surface: 2.5YR light red 6/6; core: 7.5YR brown 5/2
8166/5	5042	K2-V	5AB	280	140		basalt, much, small	chalk, med, medium	surface: 7.5YR reddish yellow 7/6; core: 5YR yellowish red 5/6
8193/6	5051	K2-V	5AB	280	140	-	basalt, medium, small	chalk, little, small	surface: 7.5YR reddish yellow 7/6; core: 10YR grayish brown 5/2
8188/1	5043	K2-V	5AB	380	160	ring base	basalt, much, small	chalk, little, coarse	surface: 5YR reddish yellow 7/8
8432/1	5065	K2-V	5A	200	90	ring base	basalt, much, small	chalk, med, medium	surface: 7.5YR reddish yellow 6/6; core: 10YR very pale brown7/4
8474/1	5095	K2-V	3	260	110	upright upper part	chalk, medium, coarse	sand, little, medium	surface: 7.5YR reddish yellow 7/6; core: 10YR yellow 7/6
7798/1	5298	K -V	3	320	120	upright upper part	basalt, much, small	chalk, little, medium	surface: 5YR reddish yellow 6/6
10308/22	4244	U3B	5A	180	70	red paint on rim (?)	organic, med., medium	chalk, little, small	surfaces: 5YR 7/6 core: 10YR 7/2
10410/11	4269	U0/U3	5AB	180	93	ring base 60	bas, much, medium	chalk, little, coarse	surfaces: 5YR 7/6 core: 10YR 7/3
10571/24	4303	U3A	5AB	240	-		basalt, much, small	Chalk, little, coarse	out: 7.5YR 7/4; in: 5YR 7/4 core: 10YR 4/2
10572/1	4304	U3A	5AB	300		rim to shoulder, not illustrated	basalt, much, medium	chalk, little, coarse	surfaces: 2.5YR 6/6 core: 10YR 5/3
10515/2	4283	U3A	5AB	320			basalt, much, small	chalk, little, medium	out: 7.5YR 7/6 in: 5YR 7/4 core: 7.5YR 5/2
10260/2	4207	U2	5A	200		traces of red paint on rim	basalt, med, medium	chalk, little, coarse	surfaces: 2.5Y N8/ core: 10YR 8/3
12073/7	5423	W2	5AB	300		worn	basalt, little, medium	chalk, little, medium	surfaces: 5YR 7/3 core: 7.5YR 6/2
12120/9	5439	W2	5AB	340	-		basalt, medium, small	Chalk, med., coarse	out: 7.5YR 6/4; in: 5YR 7/4 core: 2.5Y 4/1
12176/7	5458	W2	5A	270			basalt, much, small	chalk, little, coarse	out: 5YR 6/6; in: 10R 6/4 core: 10YR 3/1
11543/4	6473	R2	3	290			chalk, medium, coarse	basalt, med., small	-
11573/4	6488	R2	05L	300			basalt, much, small	chalk, little, medium	-
10231/5	4210	U1	5F	300			basalt, much, medium	Chalk, little, medium	surfaces: 7.5YR 7/6 core: 7.5YR 5/2
10256/1	4217	U0	5AB	300			basalt, much, medium	chalk, little, medium	out: 10YR 8/4; in: 5YR 7/6 core: 10YR 5/2
10272/9	4217	U0	5A	290		Bell-shaped krater?	basalt, much, medium	chalk, little, coarse	out: 2.5YR 6/6; in: 5YR 6/6 core: 10YR 5/4
4103/1	1233	E2-IV	5AB	320	120		basalt, much, small	chalk, little, small	surface: 5YR reddish yellow 6/6; core:5YR yellowish red 5/6
BL09B Cyma Profiled Bowl with Applied Figurines									
6474/1	3515	N2-VI	3C	220	90	applied animal figures	basalt, much, small	chalk, little, medium	surface: 5YR reddish yellow 6/8; core: 10YR light yellow-brown 6/4

BL09 Cyma Profiled Bowls



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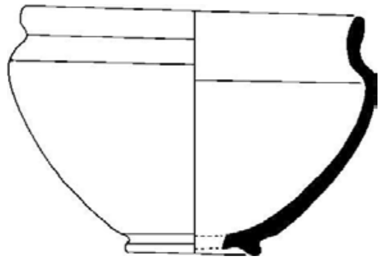
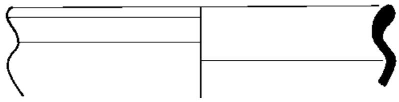


8207/1

6866/1



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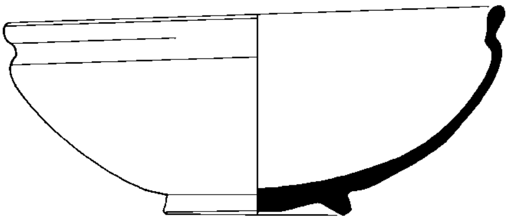

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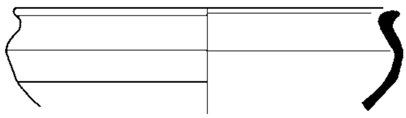
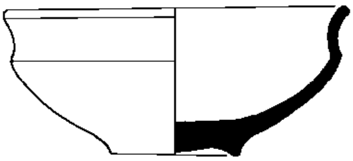
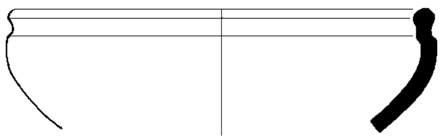


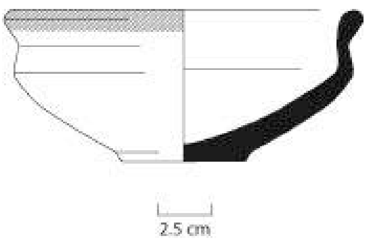
8193/6



8432/1



7789/1 (K V)



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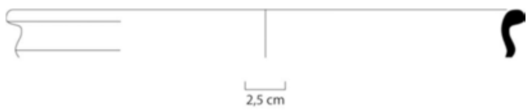

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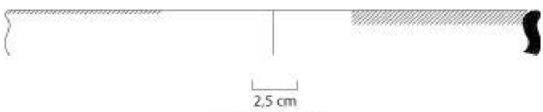

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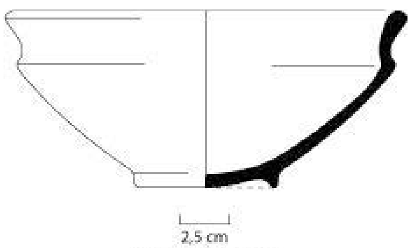
20515/2



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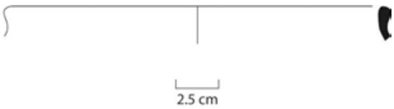
BL09 Cyma Profiled Bowls (cont.)



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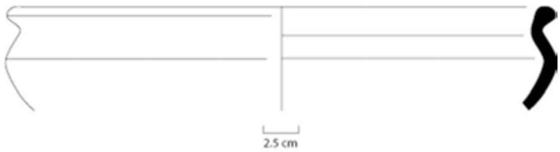

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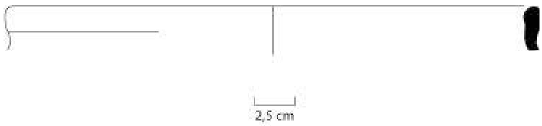
L5458-12176/7


10231/5



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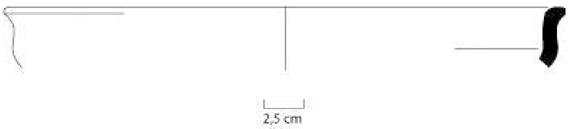

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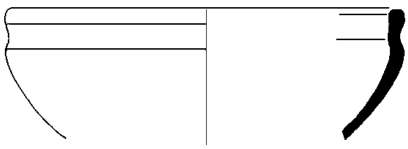
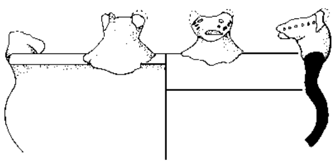
10272/9

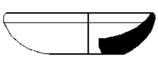

10256/1


4103/1 E IV

BL09B Cyma Profiled Bowl with Applied Figurines


6474/1

BL10 Miniature Bowls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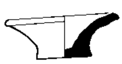
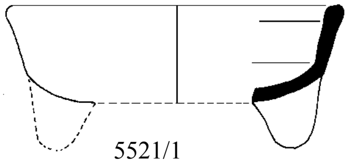

7513/2


8330/1


8775/1

Various Bowls



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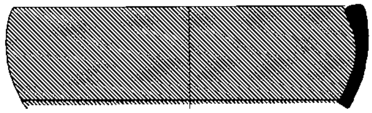

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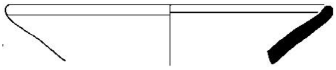

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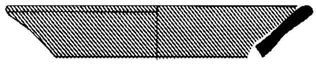

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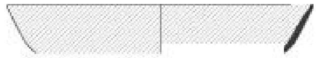
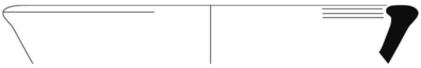


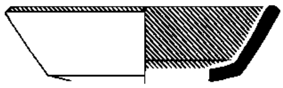
2.5 cm

L4205-10215/1



2.5 cm

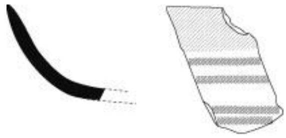
L5443-12127/3



4808/5

2.5cm

L4217-10286/2



1 cm

L5415-12067/2

BL10 Miniature Bowls

Reg no	Locus	phase	Rim	width cm	height cm	Surface, details	main temper	second temper	color
4217/1	3109	H							
7513/2	5121	K2 Str. V	5A	10	33		basalt, much, small	chalk, little, small	10YR very pale brown 7/4
8330/1	5074	K2 Str. V	-	5.5–6	15–20	handmade	basalt, medium, small	chalk, little, small	7.5YR reddish yellow 7/6
8775/1	5268	K Str. V	2B	5.5	25		basalt, much, small	chalk, little, medium	-

Various Bowls

Reg no	Locus	phase	Rim	width cm	height cm	Surface, details	main temper	second temper	color
5521/1		surface							
6502/1	3546	N1 Str. V	2B	35	10-12	red slip in & out (10R 5/6), traces of burnish	dark minerals, medium, medium	-	surface & core: 7.5YR pink 7/4
5829/10	2915								
6010/1	3003								
10215/1	4205	U0	1C	15	-	red slip in (10R 4/6) & out (10R 5/8)	chalk, medium, medium	dark minerals, little, small	surfaces: 5YR 7/6 core: 10YR 6/3
12127/3	5443	W2	5L	27	-	-	basalt, little, medium	chalk, little, coarse	out: 10YR 8/4; in: 10YR 8/2; core: 10YR 8/3
4808/5	1800								
10286/2	4217	U0	5G	16	-		basalt, medium, medium	organic, little, medium	out: 5YR 7/6; in: 7.5YR 7/4; core: 2.5Y 6/2
12067/2	5415	W0	1C	15		Red slip in & out 10R 5/6; burnish, painted stripes (10R dusky red 3/3)	-	sand, little, small	out: 5YR 6/4; in: 2.5YR 5/6 core 7.5YR 4/2

Rim 1B: cut, thickened inside; 1C: thinned; 2B: thickened inside, flattened; 5L: everted rim, thickened inside

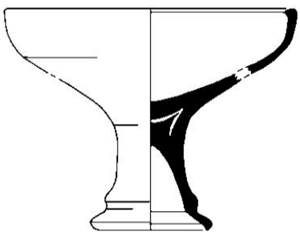
Appendix 5B Chalices

CL01 Rounded chalices

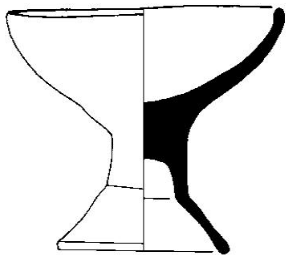
Reg.no	locus	phase	Pres.	height mm	rim width	foot height	Bowl depth	surface	Main Temper	Second temper	color
6964/1	3705	S V	whole	170	220	60	80	Plain	Basalt, much, small	Chalk, medium, coarse & small	surface: 10YR light yellowish brown 6/4; core: 10YR 7/3
8179/1	5043	K2 V	whole	170	190	70-80	65	Plain	Basalt, much, small	Chalk, little, medium	surface: 5YR reddish yellow 7/6
8254/1	5041	K2 V	whole	200	195	80	70	Plain	Basalt, much, small	Chalk, medium, medium & Small	surface: 5YR reddish yellow 6/8; core: 7.5YR 6/6
9604/1	6178	R V	whole	180	195	95	80	Plain	Basalt, much, small	Chalk, little, medium	surface: 5YR reddish yellow 7/6; core: 7.5YR 7/6
10419/1	4255	U3B?	whole	153	162	92	40	Red slip	Basalt, much, small	Chalk, little, coarse	out: 10YR 8/4; in: 10YR 7/3; core: 7.5YR 6/3
10978/7, 10972/5*	Both 4355	U3B?	Bowl; foot		130			Plain	Basalt, much, small	Chalk, little, coarse	surfaces: 7.5YR pink 7/4; core: 10YR gray 4/1
10584/6*	4301	U3B	rim shard		150			Plain	Basalt, very little, medium	-	surfaces: 5YR pink 7/4; core: 7.5YR gray 4/1
10586/3*	4303	U3B	rim sh.		130			Plain	Basalt, much, small	Chalk, little, coarse	surfaces: 2.5YR 6/6; core: 7.5YR 5/2
14128/4*	4367	U3B**	rim sh.		250			Plain	Chalk, medium, coarse	quartz, little, coarse	surfaces: 5YR pink 7/4; core: 7.5YR 6/4
10983/4*	4360	U3B	rim sh.		250			Plain	Basalt, much, medium	Chalk, little, medium	surfaces: 7.5YR pink 7/4; core: 7.5YR 6/4
10498/1	4277	U3A	Bowl	-	168	-	45	Plain	Basalt, much, medium	Chalk, little, coarse	out: 2.5YR 6/6; in: 7.5YR 7/4; core: 7.5YR 4/2
10925/1*	4348	U3A	rim sh.		200			Plain	Chalk, med., medium	Basalt, medium, small	out: 10YR 6/3; in: 7.5YR 6/4; core: 10YR 4/1
11568/1*	6473	R2b VB	rim sh.	-	130	-	-	Plain	Basalt, medium, small	Chalk, little, coarse	out: 5YR 7/4; in: 2.5YR 6/6; core: 5YR 6/4
14017/1	6675	R2 3B	whole	177	177			Plain	Organic, medium, med.	Chalk, little, coarse	out: 2.5YR 6/6
12816/1	1717	S V	whole	160	190			Plain	Basalt, much, medium		out: 5YR 7/6
7666/2	5266K	K1/ Str. IV	bowl		140		55	soot on exterior	basalt, little, small	chalk, little, small	surface: 7.5YR 7/4; core: 5YR yellowish red 5/6
7650/1	5266K	K / IV	foot; bowl base						basalt, much, small	chalk, little, coarse	surface: 2.5YR light red 6/8; core: 10YR dark gr-brown 4/2
14265/1	1775	S IV?	Bowl		180			Plain	Basalt, medium, small	Quartz, little, medium	out: 2.5YR 6/4; in: 5YR 7/6; core: 2.5Y 4/1
12111/34	5439	W2 V	rim sh.		250	-	Ca 50	Plain	Basalt, much, small	Chalk, little, medium	out: 10R 6/8; in: 2.5YR 6/6; core: 2.5Y 4/1
10884/1*	4345	U0	rim sh.		250			plain	Basalt, much, small	Chalk, medium, coarse	surfaces: 2.5YR 6/6; core: 7.5YR 5/4
10304/11	4233	U4	Base fr	-	-				Organic, much, coarse	Chalk, medium, coarse	surfaces: 5YR 7/8; core: 10YR 4/1
10304/9	4233	U4	rim sh.	-	340	-	-	plain	basalt, much, small	chalk, medium, coarse	surfaces: 7.5YR pink 7/4; core: 10YR 6/3

*not illustrated item; **fill below the floor 4330 represents the construction phase of U3B.

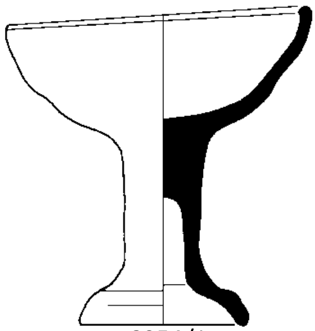
CL01 Rounded Chalices



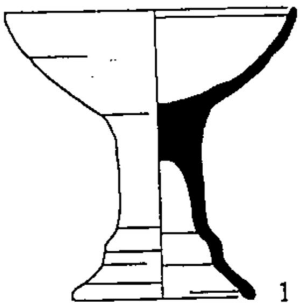
6964/1



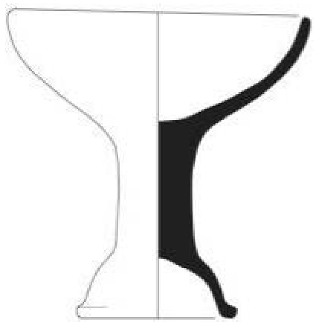
8179/1



8254/1

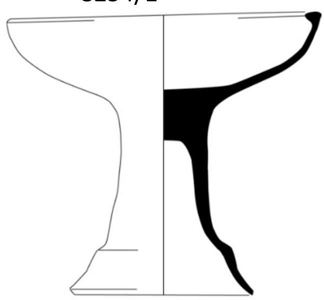


9604/1



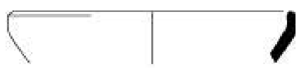
2,5 cm

L.6675
14017_1



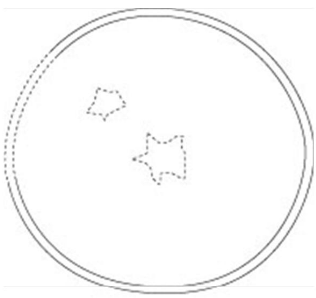
2,5 cm

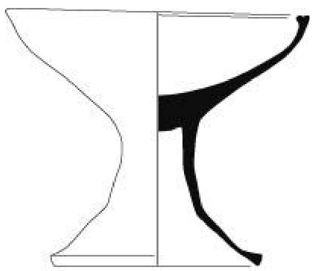
L.12816



2,5 cm

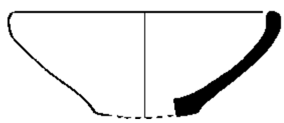
L6473-11568-1





2.5 cm

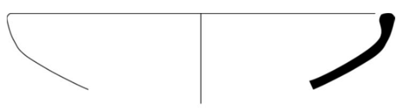
L...-10419/1



7666/2

2.5 cm

L4277-10498/1

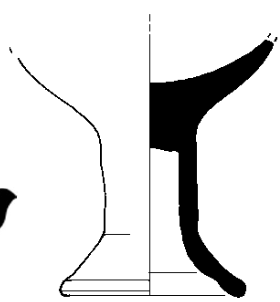


2,5 cm

L.14265_1

2,5 cm

L5439-12111-34



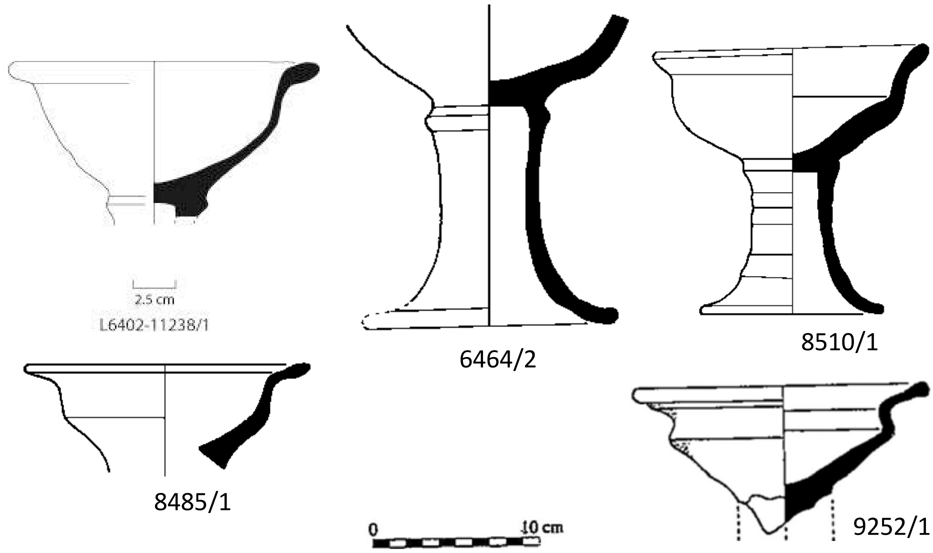
7650/1

CL01 Rounded Chalices (cont.)

Chalice bowl and rim 10304/9 and 10304/11. Note the clay ball in the bowl base.

Chalice-bowl 10304/11, thick walls and big overall size. Chalice 40419/1, with traces of fire in.

CL02A Everted, Carinated Chalices



6464/2

8510/1

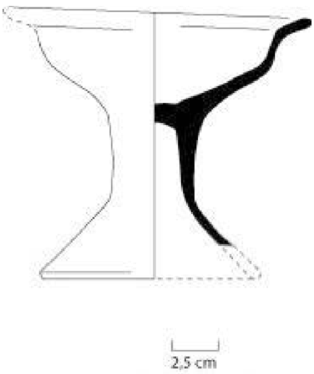
8485/1

9252/1

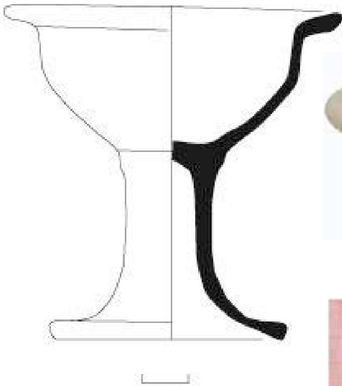
CL02A Everted, Carinated Chalices										
Reg.no	locus	phase	Pres.	height	rim width	Foot height	Bowl depth	Main Temper	Second temper	color
11238/1	6422	R7b/ VIIA	Bowl	-	180	-	80	Chalk, medium, coarse	Sand, medium, medium	surfaces: 5YR 6/6; core: 7.5YR 6/6
6464/2	3517	N2 VI	foot & bowl base	>170	-	115	-	Basalt, much, small	Chalk, medium, medium	surface & core: 10YR yellow 7/6
8510/1	5100	K2 V	whole	168	170	90	68	Basalt, much, small & medium	Chalk, medium	2.5YR light red 6/8; core: 7.5YR 6/6
8485/1	5095	K2 V	Bowl	-	170	-	45	Basalt, medium, Small	Chalk, little, medium	surface: 10YR 7/4; core: 10YR dark gray 4/1
9252/1	6106	R V	Bowl	-	190	-	70	Basalt, much, small & medium	Chalk, medium, Coarse & medium	out: 5YR reddish yellow 6/8; core: 7.5YR 6/8
10674/9*	4312	U3B	rim sh.		130			Basalt, much, small	Chalk, little, coarse	surfaces: 2.5YR 6/6; core: 7.5YR 7/4
10675/2*	4312	U3B	rim sh.		180			Basalt, much, small	Chalk, little, small	surfaces: 5YR pink 7/4; core: 7.5YR 6/3
10732/4*	4324	U3B	rim sh.		160			Quartz, little, small	-	out: 2.5YR 5/3; in: 5YR 5/2; core: 5YR 4/2
10768/11*	4328	U3B	rim sh.		150			Basalt, much, small	Chalk, little, medium	out: 5YR 7/6; in: 5YR 6/6; core: 7.5YR 5/3
*not illustrated										

Appendix 5B Chalices

CL02A Everted, Carinated Chalices (cont.)

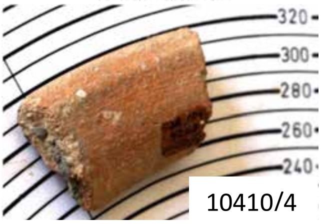


L4312-10743-1



L4255-10381/1

12307/2



10410/4

chalice foot fragment 12299/3

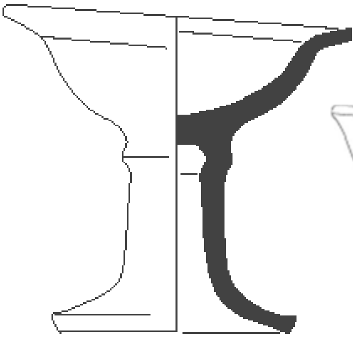
CL02A Everted, Carinated Chalices

Reg.no	locus	phase	Pres.	height	rim width	Foot height	Bowl depth	Main Temper	Second temper	color
10410/4	4269	U0/U3	rim shard	-	300	-	-	Quartz, much, coarse	Chalk, little, coarse	out: 5YR 6/4; in 5YR 6/6; core: 7.5YR N4/
10743/1	4312	U3B	whole	138	150	83	50	Basalt, much, small	Chalk, little, coarse	out: 7.5YR 7/6; in: 5YR 7/4; core: 10YR 6/3
10312/5*	4239	U5	rim shard	-	150	-	-	Basalt, much, medium	Chalk, medium, coarse	out: 2.5YR 6/8; in: 5YR 7/6; core: 10YR 6/3
12307/2	3929	N1 VA	Bowl fr	-	170			basalt, much, small-medium	chalk, little, medium-coarse	-
12299/3	3916	N	foot fragm.			width 100		basalt, small	pale slip (?), dark brown and red decoration	out: 2.5YR 6/6; in: 7.5YR 6/4; core: 10YR 5/2

CL02B Flaring Chalices

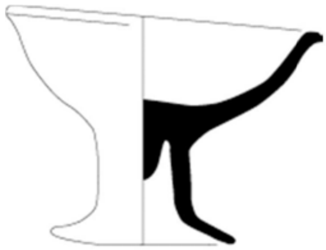
12698/1	1710	S2b V	3	170	190			Basalt, medium, small	Chalk, little, coarse	surfaces: 5YR 6/6; core: 7.5YR 6/4
12731/1	1720	S2b V	3	127	160	80	60	Basalt, much, medium	Chalk, little, coarse	out: 7.5YR pink 7/4; in: 7.5YR pink 7/3
10481/9	4255	U3B?	1	-	170	-	-	Quartz, medium, small	Sand, medium, small	surfaces: 5YR 6/6; core: 2.5YR 5/4
10697/2	4312	U3B	1		190			Basalt, medium, small	Chalk, little, coarse	out: 7.5YR 8/4; in: 7.5YR 7/4; core: 7.5YR 6/4
10244/2	4214	U3A	1	-	300	-	-	Organic, little, medium	Sand, little, small	out: 10YR 7/3; in: 7.5YR 7/4; core: 10YR 5/2
10540/1	4285	U3A	3		190			Basalt, little, medium	Chalk, little, coarse	out: 2.5YR 6/6; in:2.5YR 6/4; core: 7.5YR 5/2
10863/4	4343	U3	1		170			Quartz, medium, small	Dark minerals, little, small	out: 5YR 7/4; in: 2.5YR 6/6; core: 5YR 5/6

CL02B Flaring Chalices



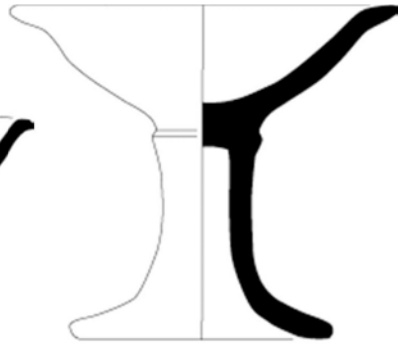
2,5 cm

10540_1



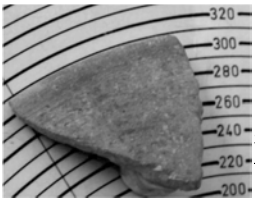
2,5 cm

L1720-12731-1



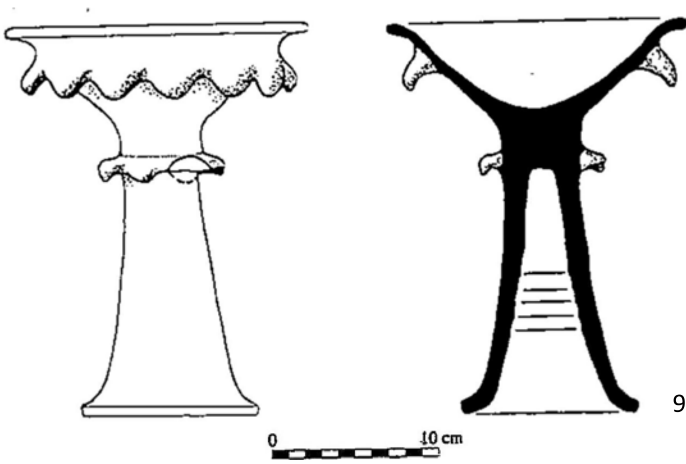
2.5 cm

L 1710-12698-1



10244/2 rim shard of a wide, flaring chalice

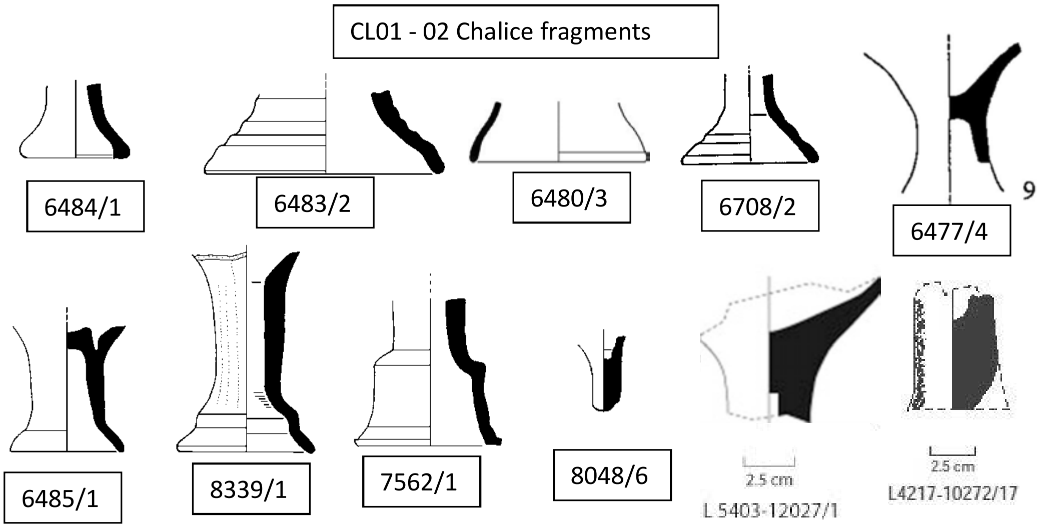
CL02C Flaring Chalice with Petals



9595/1

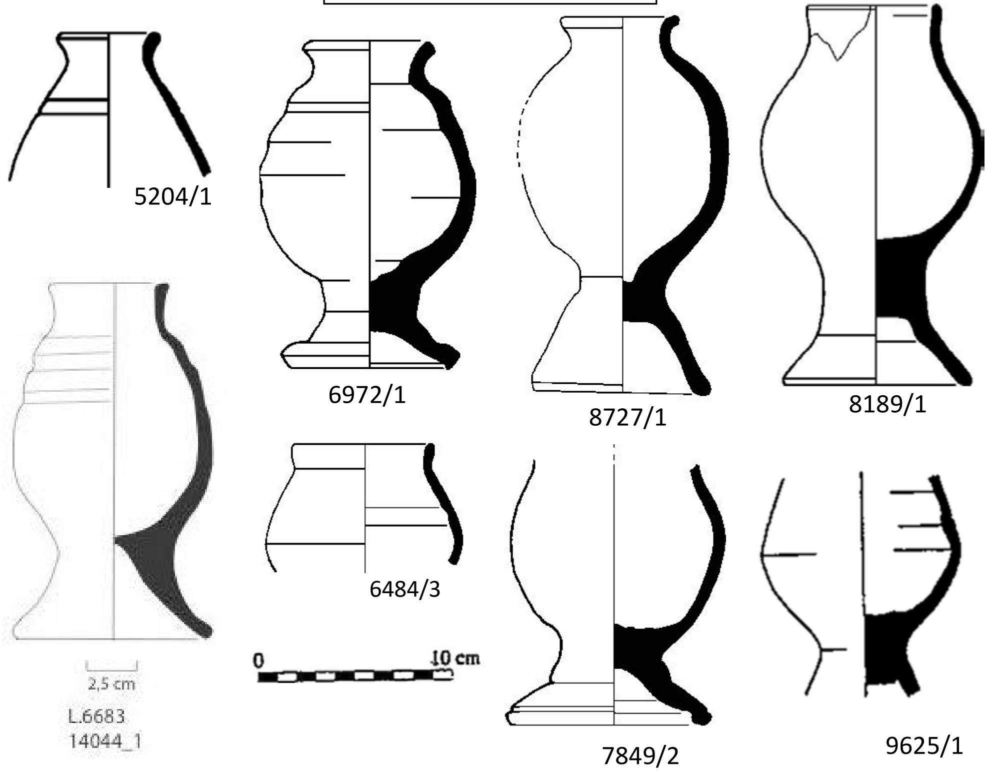
CL02C Flaring Chalices with Petals										
Reg.no	locus	phase	Pres.	height	rim width	Foot height	Bowl depth	Main Temper	Second temper	color
9595/1	6143	R V	3	235	180	145	53	Basalt, much, small	Chalk, little, small	surface & core: 10YR yellow 7/6; traces of pale slip

Appendix 5B Chalices



CL00 Chalices, no further defined							
Reg.no	locus	phase	Pres.	Foot height	Small grits	Big grits	color
6484/1	3531	N2 VI	Foot fr	-	Many black, white	White, few gray	surface & core: 7.5YR light brown 6/4
6483/2	3531	N2 VI	Foot fr	-	Many black & white	white	surface: 5YR 7/6; core: 7.5YR pinkish gray ?/2
6480/3	3531	N2 VI	Foot fr	-	Many black & white	Few white	surface: 7.5YR 7/4; core: 10YR 7/4
6477/4	3531	N2 VI	Mid fr	-	Many black, white & gray	White, brown, gray	surface: 5YR red-yell 6/8: core: 10YR light gray 7/2
6708/2	3599	N1 V	Foot fr	-	Many black, white	Gray, white	surface: 10YR 7/3; core: 7.5YR 7/6
6485/1	3516	N -	Foot	95	Many black, few white	White, few gray	surface: 10YR 8/4; core: 10YR gray 5/1
8339/1	5056	K2 V	Foot	150	Many gray, white, black	Many gray, few white, black	surface: 7.5YR 7/8; core: 10YR brown 5/?
7562/1	5115	K	foot				
8048/6	5020						
6560/1	3569						
12027/1	5403		Base fr		Chalk, much, medium	Basalt, little, medium	out: 2.5YR 6/6, in: 7.5YR 6/4; core: 10YR 5/2
10272/17	4217	U0	Base fr	-	Organic, much, coarse	Chalk, much, coarse	out: 10YR 8/2; core: 2.5Y N6/

G01 Rounded Goblets



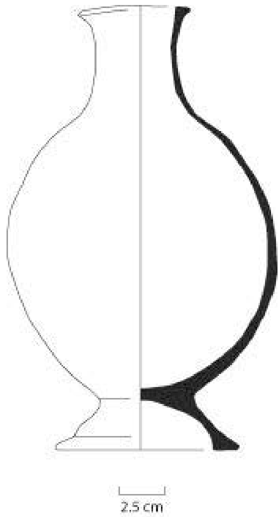
Rounded Goblets G01

Reg.no	locus	Area-phase/ stratum	Pres.	height cm	width cm	mouth cm	Remarks	Small grits / main temper	Big grits/ second temper	color
5204/1	2079	G3 / VI	2	-	>8	3.5	plain	Many black, few white	Few white	surface: 7.5YR reddish yellow 7/6; core: 7.5YR pink 7/4
6972/1	3726	S / VI	3	14.3	9.3	5.9	traces of fire out	Basalt, much, small	chalk, medium, coarse	surface: .5YR pink 7/4; core: 7.5YR pinkish white 8/2
6484/3	3531	N2 / VI	2		10	7.5	plain	Basalt, much, small	chalk, little, medium	surface & core: 10YR very pale brown 7/4
8727/1	5009	K / VI	3	20.5	11	6.8	plain	Basalt, much, small	quartz, much, medium	surface: 5YR reddish yellow 6/6; core: 7.5YR dark gray N4
8189/1	5043	K2 / V	3	19	11	5.8	plain	Basalt, much, small	chalk, little, medium & coarse	surface & core: 10YR very pale brown 8/3
7849/2	5309	K2 / V	2	-	11	-	plain	Basalt, much, small	chalk, little, medium & coarse	surface: 5YR reddish yellow 7/6; core: 10YR very pale brown 7/4
9625/1	6197	R / V	2	>12.5	10	>7	plain	Basalt, much, small	chalk, little, medium	surface: 5YR reddish yellow 6/8; core: 7.5YR red-yell. 6/8
14044/1	6683	R^{2}3c	3	18	9.5	6		Basalt, much, Medium	Chalk, little, Coarse	out: 2.5YR 6/6; in: 5YR 6/6; core: 2.5Y 4/2

Pres=Preservation: 0=body shard, 1=rim shard, 2=larger fragment, 3=(almost) whole vessel or profile.

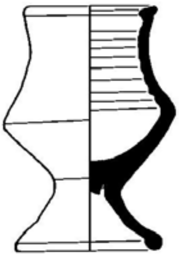
Appendix 5C Goblets

G02 Narrow Necked Goblet

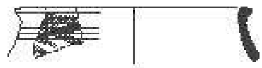


L4269-10407/1

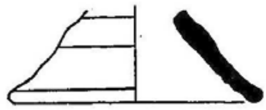
G03 Biconical Goblet 6484/2



G04 Undefined Goblets



11568/2 (diam. 6 cm)



7513/1

Goblet with high, narrow neck G02

Reg.no	locus	phase	Pres.	height cm	width cm	mouth	remarks	Main temper	Second Temper	color
10407/1	4269	U0/U3	3	25.3	15	4.1	Plain surface	Chalk, medium, small	Sand, medium, small	surface & core: 10YR yellow 7/6

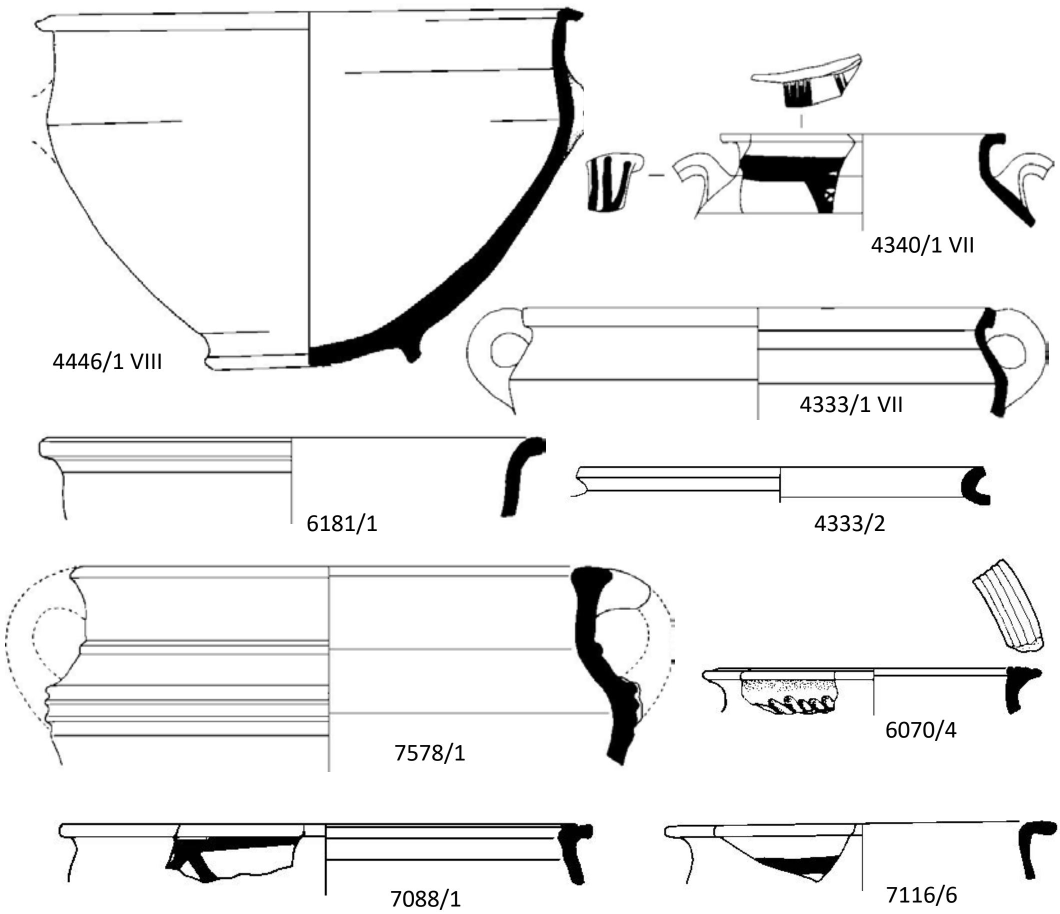
Biconical Goblet G03

6484/3	3531	N2 VI	3	15	11	70	Plain	Basalt, much, small	chalk, medium, coarse	surface: 7.5YR 7/6; core: 10YR very pale brown 7/4

Goblet, further undefined G04

Reg.no	locus	phase	Pres.	mouth	surface	Main Temper	Second Temper	color
10308/7	4244	U3B	1	14	plain, not illustrated	-	-	-
10526/7	4284	U4?	1	12	plain, not illustrated	Basalt, little, med.	Chalk, very little, medium	out: 5YR 6/6; in: 5YR 7/6; core: 5YR 6/4
12047/6	5410	W0	1	8	plain, not illustrated	Quartz, medium, medium	Basalt, little, medium	surfaces: 2.5YR 6/6; core: 7.5YR 6/4
12018/1	5402	W0	base	-	plain, not illustrated	Basalt, medium, small	Sand, medium, medium	
12126/9	5442	W4	base	-	plain, not illustrated	Chalk, little, medium	Basalt, little, medium	
11568/2	6473	$R^2$2b	1	6	Red-brown 10R 5/4 and gray 2.5YR 3/1 stripes	Basalt, little, small	Chalk, very little, Coarse	out: 2.5YR 7/6; in: 7.5YR pink 7/4
7513/1	5121	K V	Foot frag.	base 15.5	-	white grits, quartz	few black grits	surface: 10R red 5/6; core: 2.5YR N5

KR01 Kraters with Everted Rim

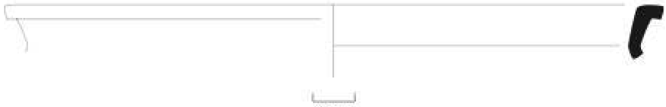


KR01 Kraters with Everted Rim

Reg. no	Locus	Area-phase/ Stratum	Rim	Diameter/ height (mm)	Surface	main temper	second temper	color	pres.
4446/1	3175	H4/VIII	5F	500/245	worn inside	basalt, much, small to coarse	chalk, little, coarse	surface: 7.RYR pink 7/4 core: 10YR white 8/2	restored 60 %
4340/1	3137	H3/VII	5F	250	dark gray (5YR 4/1) decoration	basalt, medium, small	chalk, little, small	surface & core: 5Y light olive gray 6/2	2
4333/1	3137	H3/VII	5B	400		organic, little, medium	basalt, much, small	surface: 10YR very pale brown 8/4; core: 10YR gray 5/1	2
4333/2	3137	H3/VII	5	-	-	-	-	-	1
6181/1	3040	H2/ fill of Str.VI	5AB	480		organic, little, medium	basalt, medium, small	surface: 7.RYR pink 7/4; core: 7.5YR gray N5	1
6070/4	3020	H2/ fill of Str.VI	5G	220	impressed strokes below rim	basalt, much, coarse	chalk, much, medium & small	surface: 2.5YR light red 6/8; core: 7.RYR pink 7/4	1
7088/1	4046	J1 / V	5I						1
7116/6	4054	J / V	5F						1
7578/1	5159	K2/V	5M	500/>24	grooved neck	dark minerals, much, medium	chalk, medium, coarse	surface: 10YR very pale brown 8/3; core: 10YR very pale brown 7/3	rim to shoulder

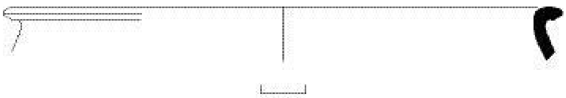
Appendix 5D Kraters

KR01 Kraters with Everted Rim



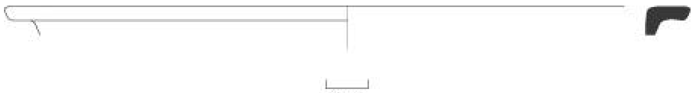
2.5 cm

L 4326-10733_44



2,5 cm

L.10583_1



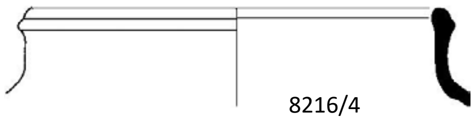
2.5 cm

L9920-11104/7

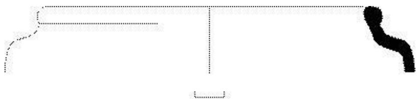
12087/14

10272/11

KR02 Necked Kraters

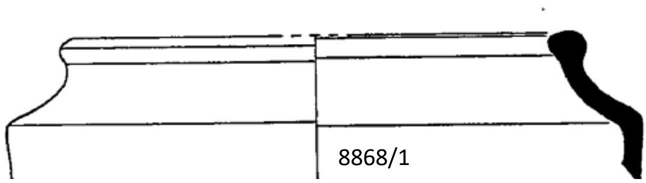


8216/4



2.5 cm

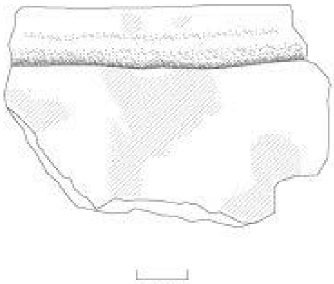
L14367



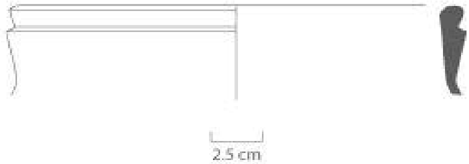
8868/1

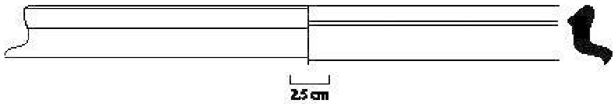
KR01 Kraters with Everted Rim (cont.)									
Reg. no	Locus	Area-phase/ Stratum	Rim	width cm	Remarks	main temper	second temper	color	pres.
10733/4	4326	U3B	10B	33		basalt, much, medium	chalk, little, coarse	out: 10YR 8/2; in: 10YR 8/3; core: 7.5YR 6/4	1
12087/14	5427	W3	5N	25		basalt, much, medium	chalk, little, medium	out: 5YR 7/4; in: 2.5YR 6/6; core: 2.5Y 4/1	1
10583/1	4301	U3B	5A	34		basalt, much, medium	chalk, little, medium	out: 7.5YR 8/4; in: 7.5YR 8/3; core: 10YR 5/3	1
10272/11	4217	U0	5I	26		basalt, much, medium	chalk, medium, coarse	out: 5YR 7/4; in: 5YR 6/4; core: 10YR 5/3	1
11104/7	9920	R	5F			quartz, medium, medium	chalk, medium, coarse	surfaces: 5YR light reddish brown 6/4; core: 5YR gray 5/1	
KR02 Necked Kraters									
8216/4	5027	K2/V	3J	29	traces of soot inside	organic, -	basalt, little, small	7.5YR reddish yellow 7/6	2
8868/1	5262	K2/V	3	38		basalt, much, small	chalk, medium, medium	10YR very pale brown 8/4	2
14367/1	1838	S		16		basalt, medium, medium	-	surface: 10YR very pale brown 7/4	1

KR02 Necked Kraters (cont.)



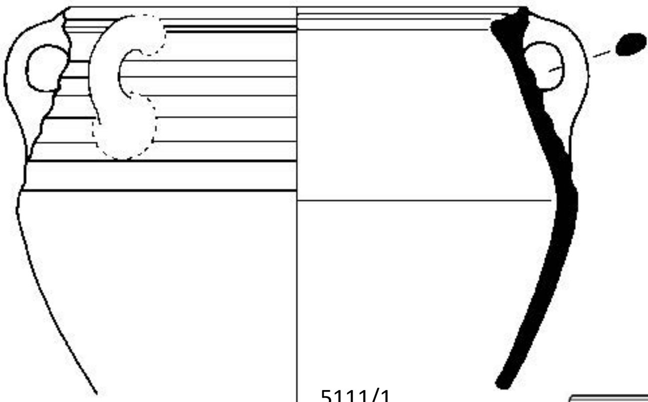
L9922-11105/8



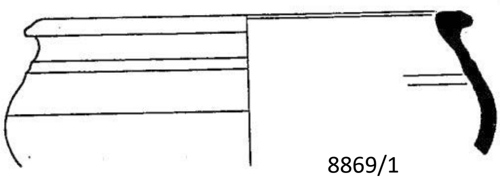


L 9882-11023/1

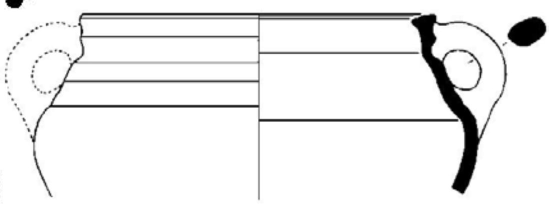
KR03A Thick Rimmed, Inverted Kraters



5111/1



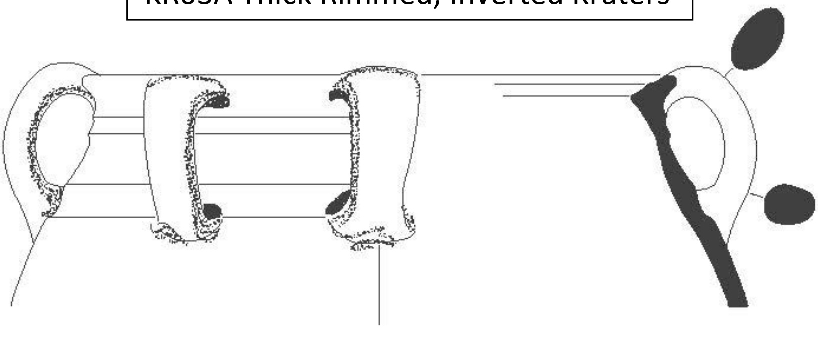
8869/1



8321/1

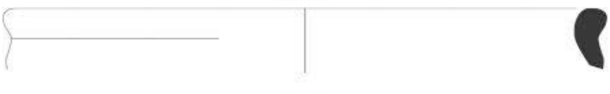
KR02 Necked Kraters (cont.)									
Reg. no	Locus	Area-phase/ stratum	Rim	width/ height cm	Surface	main temper	second temper	color	pres.
11105/8	9922	R	6F	26	brown slip or paint 5YR 4/3	organic, medium, med.	sand, medium, medium	out: 5YR pink 7/4; in: 5Y light gray 7/2; core: 7.5YR dark gray N4	1
11023/1	9882	R	5A	26		organic, medium, small	basalt, much, medium	surfaces: 2.5YR light red 6/6; core: 2.5YR weak red 4/2	1
KR03A Thick Rimmed, Inverted Kraters									
5111/1	2050	G2/V	4C	40/ ca. 40	at least three handles	basalt, much, medium	chalk, medium, coarse	surface: 2.5YR light red 6/8; core: 10YR dark gray 4/1	2
8321/1	5064	K2/V	3C	28/ ca.21		basalt, medium, small	dark minerals, little, medium	surface: 10YR yellow 7/6; core: 7.5YR reddish yellow 7/8	rest. 80 %
8869/1	5271	K1/IV	6H	26	traces of red-brown slip	organic, medium, med.	Basalt, medium, small	surface: 7.5YR reddish yellow 7/6; core: 10YR gray 5/1	2

KR03A Thick Rimmed, Inverted Kraters



2,5 cm

14360_1



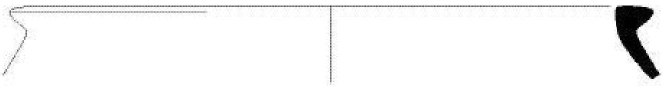
2,5 cm

L6492-11578-1

KR03A Thick Rimmed, Inverted Kraters (cont.)

Reg. no	Locus	Area-phase/stratum	Rim	width/height cm	Remarks	main temper	second temper	color	pres.
14360/1	1835	S	6H	35/ >19		basalt, much, medium	chalk, very little, coarse	out:10YR very pale brown7/3; in: 7.5YR strong brown 5/6; core: 10YR gray 5/1	2
11578/1	6492	R2	6G3	48		basalt, much, medium	chalk, little, coarse	-	
12113/2	5427	W3	3C	30		basalt, medium, med.	chalk, little, medium	surfaces: 2.5YR 6/6 core: 2.5Y 4/1	1
12087/9	5427	W3	6H	33		basalt, medium, small	chalk, little, medium	out: 5YR 7/6; in: 7.5YR 7/4 core: 2.5Y 4/1	1
12139/3	5443	W2	3	28		basalt, much, medium	chalk, little, medium	out: 7.5YR 7/4; in: 10YR 7/3 core: 10YR 6/3	1
10239/22	4218	U3B	3C	25		basalt, much, medium	chalk, little, medium	surfaces: 7.5YR 7/4 core 7.5YR N5/	1
10239/24	4218	U3B	1B	22		basalt, much, small	chalk, medium, medium	out: 10YR 6/3; in: 5YR 6/6 core: 5YR 6/8	1
10272/2	4217	U0	6H	26		organic, little, medium	basalt, little, coarse	surfaces: 5YR 7/4 core: 2.5Y N4/	1
9733/8	6276	R	6H	36	grooved	quartz, medium, med.	chalk, medium, medium	out: 5YR pink 7/4; in: 2.5YR light red 6/6; core: 7.5YR pinkish gr 6/2	2
4035/5	1203	E1/IV	6L	28		basalt, much, small	organic, medium, med.	surface: 5YR reddish yellow 6/6; core: 7.5YR gray N5	1
8074/1	5022	K1/IV	3C	30	ridge below rim, knob handle	basalt, medium, med.	sand, little, medium	surface: 7.5YR reddish yellow 7/6; core: 5YR reddish yellow 6/8	1
5034/2	2018	G1/IV	3	45	short diagonal incisions and a row of rod impressions	organic, little, medium	basalt, medium, small	surface: 7.5YR reddish yellow 7/6; core: 10YR gray 6/1	2
12036/1	5415	W0	6G3	28	red slip in (2.5YR 5/6) & out (2.5YR 6/8), burnish on rim	basalt, much, medium	sand, little, medium	out: 2.5Y 7/4; in: 2.5Y 6/2 core: 2.5Y N5/	1
11066/2	9891	R	6A	30	traces of red 2.5YR 4/6 slip	organic, much, coarse	chalk, medium, medium	surfaces: 5YR pink 7/4; core: 2.5Y dark gray N4	1

KR03A Thick Rimmed, Inverted Kraters



2,5 cm

L5427-12113-2

12087/9

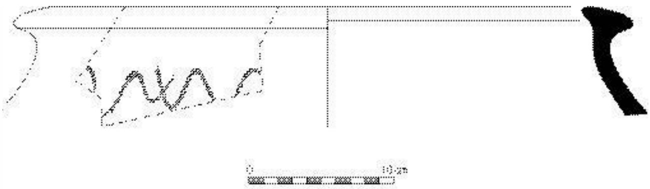
2.5 cm

L5443-12139/3

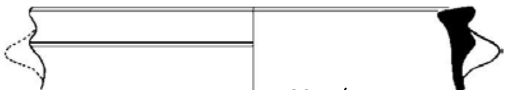
10239/22 side & front views

10239/24

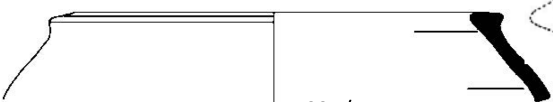
10272/2



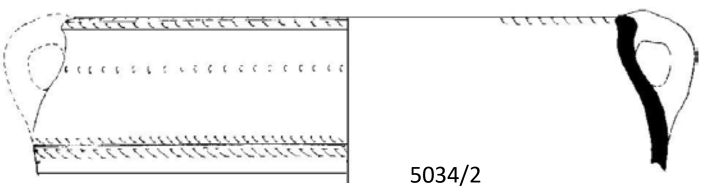
9733/8 (L6276)



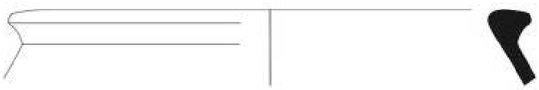
8074/1



4035/5

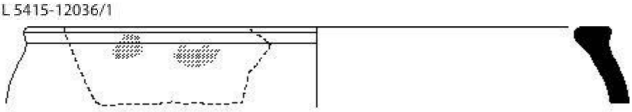


5034/2



2.5 cm

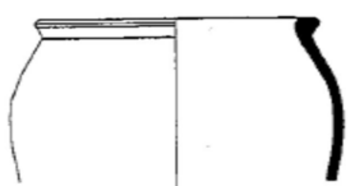
L 5415-12036/1



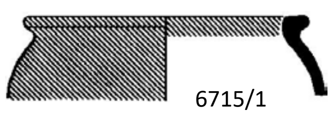
2.5 cm

L9891-11066/2

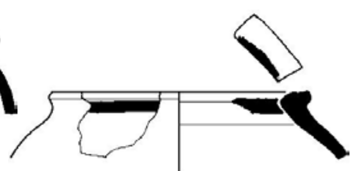
KR03B Small Inverted Kraters									
Reg. no	Locus	Area-phase/ stratum	Rim	width /height cm	Surface	main temper	second temper	color	pres.
9503/1	6181	R2 VI art-fill	6L	18		organic, medium, medium	chalk, little, small	core: 10YR dark gray 4/1	2
6715/1	3626	N2 VI art-fill	6L	14	red (2.5YR 4/8) slip	basalt, medium, small	sand, little, medium	surface: 7.5YR pink 7/4; core: 5YR reddish yellow 6/6	1
6712/1	3626	N2 VI	6L	19.5	dark brown (10YR 4/2) stripe on rim; pale 10YR 7/6 slip	basalt, medium, small	chalk, little, small	surface: 10YR very pale brown 7/3	1
12116/4	5442	W4	6H	22		chalk, little, small	basalt, little, small	out: 5YR 6/4; in: 7.5YR 7/4; core: 2.5Y 4/1	1
10243/7	4218	U3B	6H	24		chalk, little, medium	red grits, little, medium	surfaces: 7.5YR 7/6; core: 10YR 5/1	1
10034/1	9002	T1	6G3	20	red 10R 5/6 and gray 5YR 4/2 bands	chalk, medium, small	quartz, little, medium	out: 5YR reddish yellow 6/6; in: 5YR pink 7/4; core 7.5YR pink 7/4	1
12127/4	5443	W2	3	22		organic, little, medium	quartz, little, medium	out: 10YR 6/3; in: 10YR 7/2; core: 2.5Y 5/1	1
12139/7	5443	W2	6G3	24		basalt, medium, small	chalk, very little, coarse	surfaces: 5YR 6/6 core: 10YR 6/3	1
12174/3	5445	W2	5AB	25	pale slip	basalt, medium, small	chalk, little, coarse	surfaces: 5YR pink 7/4; core: 7.5YR 6/4	1
8474/1	5095	K2/V	3	26/11		organic, medium	chalk, medium, coarse		1
8554/1	5116	K1/IV	1	24		chalk, much, small	basalt, little, small	surface: 10YR very pale brown 8/4; core: 7.5YR light brown 6/4	2
8872/1	5271	K1 IV	6H	25	wheel-burnished red (10R 5/8) slip, gray (5YR 4/2) stripes	organic, medium, medium	chalk, little, medium	10YR light yellowish brown 6/4	2
10238/5	4214	U3A	10	23	red slip (10R 4/4)	basalt, much, coarse	organic, medium, small	out: 7.5YR 8/6; in: 7.5YR 8/4 core: 10YR 6/2	1
11043/1	9887	R	6L	18		organic, medium, medium	sand, medium, small	surfaces: 5YR reddish yellow 6/6; core: 7.5YR brown 5/4	1
11073/6	9891	R	6L	17		organic, little, medium	sand, medium, small	out: 5YR pink 7/4; in: 2.5YR light red 6/6; core: 5YR 6/6	1
11073/7	9891	R	3	24	red 5YR 5/4 slip	organic, medium, small	chalk, little, small	out: 5YR pink 7/4; in: 5YR 5/4; core: 2.5Y dark gray N4	1
11057/4	9898	R	3C	18		organic, much, coarse	sand, medium, medium	out: 5YR reddish yellow 6/6; in: %YR 6/4; core: 2.5Y N2	1
11067/51	9899	R	6H	16		organic, little, medium	chalk, medium, small	out: 7.5YR light brown 6/4; in & core: 2.5Y dark gray N4	1
11056/3	9899	R	10B	20	-	organic, medium, coarse	chalk, much, medium	out: 7.rYR pink 7/4; in: 7.5YR pink 8/4; core: 7.5YR pinkish white 8/2	1



9503/1



6715/1



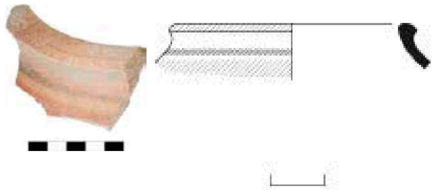
6712/1

KR03B Small Inverted Kraters (cont.)

12116/4

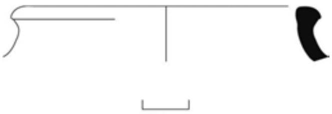
10243/7

10243/7



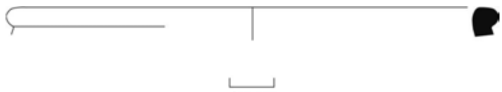
5 cm

10034/1 (rim width 20cm)



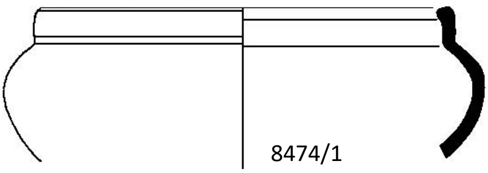
2.5 cm

L5443-12127/4

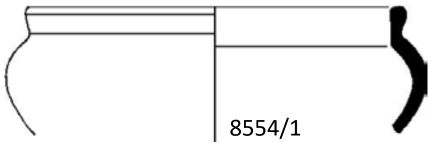


2.5 cm

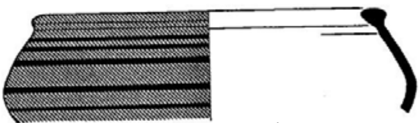
L5443-12139/7



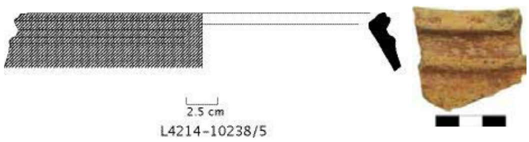
8474/1



8554/1

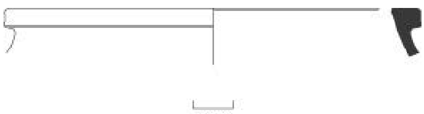


8872/1



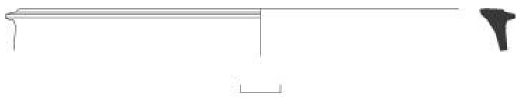
2.5 cm

L4214-10238/5



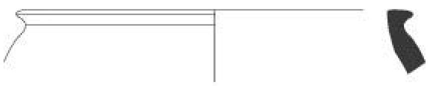
2.5 cm

L 9887-11043/1



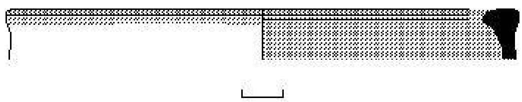
2.5 cm

L9891-11073/6



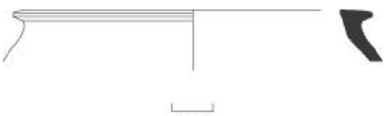
2.5 cm

L9898-11057/4



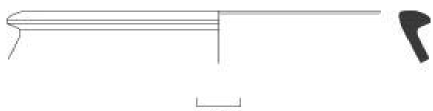
2.5 cm

L9891-11073/7



2.5 cm

L9899-11056/3

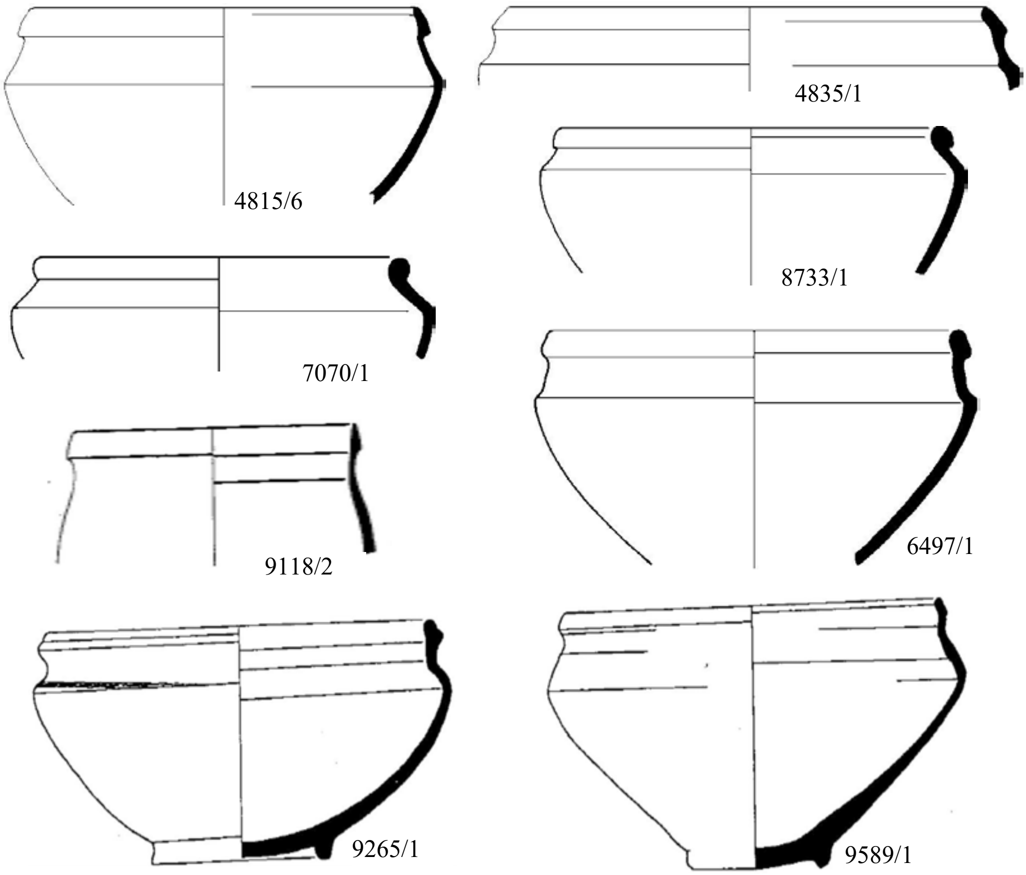


2.5 cm

L9899-11067/51

Appendix 5D Kraters

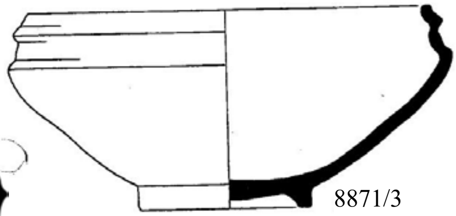
KR04 Carinated Kraters

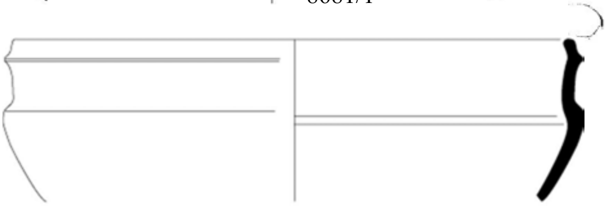


KR04 Carinated Krater									
Reg. no	Locus	Area-phase/ Stratum	Rim	Rim width/ vessel height cm	remarks	main temper	second temper	color	pres.
4815/6	1803	F3 /V	6B	30		basalt, much, small	chalk, little, medium	surface: 5YR reddish yellow 6/8; core: 2.5YR gray N5	2
4835/1	1809	F3 /V	6B	36		basalt, much, small	chalk, little, small	surface: 5YR reddish yellow 7/6; core: 10YR pale brown 6/3	1
8733/1	5237	K /V	6K	30/ 13–16		basalt, much, small	chalk, medium, coarse	surface: 5YR reddish yellow 6/6; core: 10YR gray 5/1	2
7070/1	4022		6K						1
9118/2	6027	M1/V	3J	24		basalt, much, small	chalk, much, coarse	surface: 2.5Yr light red 6/8; core: 10YR light gray 7/1	1-2
6497/1	3537	N1/V	6G3			basalt, much, small	chalk, little, coarse	surface: 2.5YR light red 6/8; core: 10YR gray 5/1	2
9265/1	6116	R / V	3J	32/18.5	worn inside & traces of fire in	basalt, medium, coarse	chalk, little, medium	surface: 5YR reddish yellow 7/6; core: 10YR yellow 7/6	rest. 75 %
9589/1	6178	R / V	3J	34/21.5	ring base, traces of fire inside	basalt, much, small	chalk, little, medium	surface: 2.5YR light red 6/6; core: 2.5YR gray N6	rest. 75 %

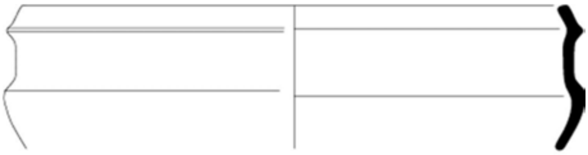
KR04 Carinated Kraters (cont.)


8681/1

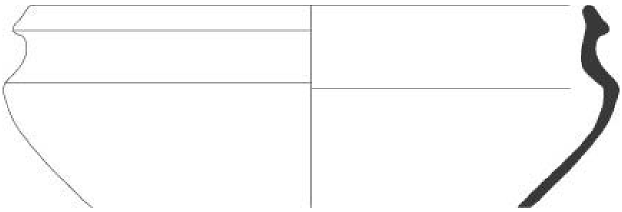

8871/3


2.5 cm
L 4326-10733-2


2,5 cm
L.10643_7


2.5 cm
L 4326/10753-1

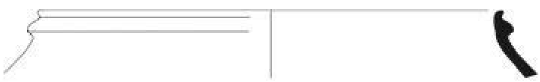

10310/2


2.5 cm
L4218-10234/6


10243/23


10239/27


10947/2

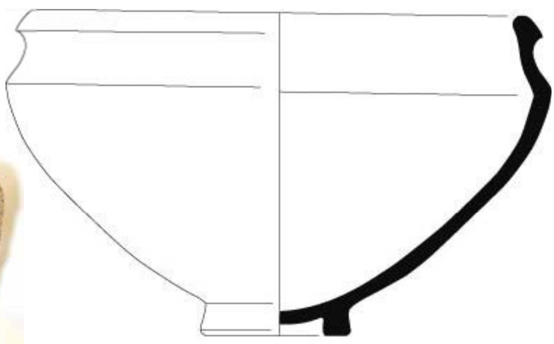

2.5 cm
L 4268-10404/6


2,5 cm
L4295-10563-1

10410/3, 10428/4,
10509/4
not drawn


10282/7

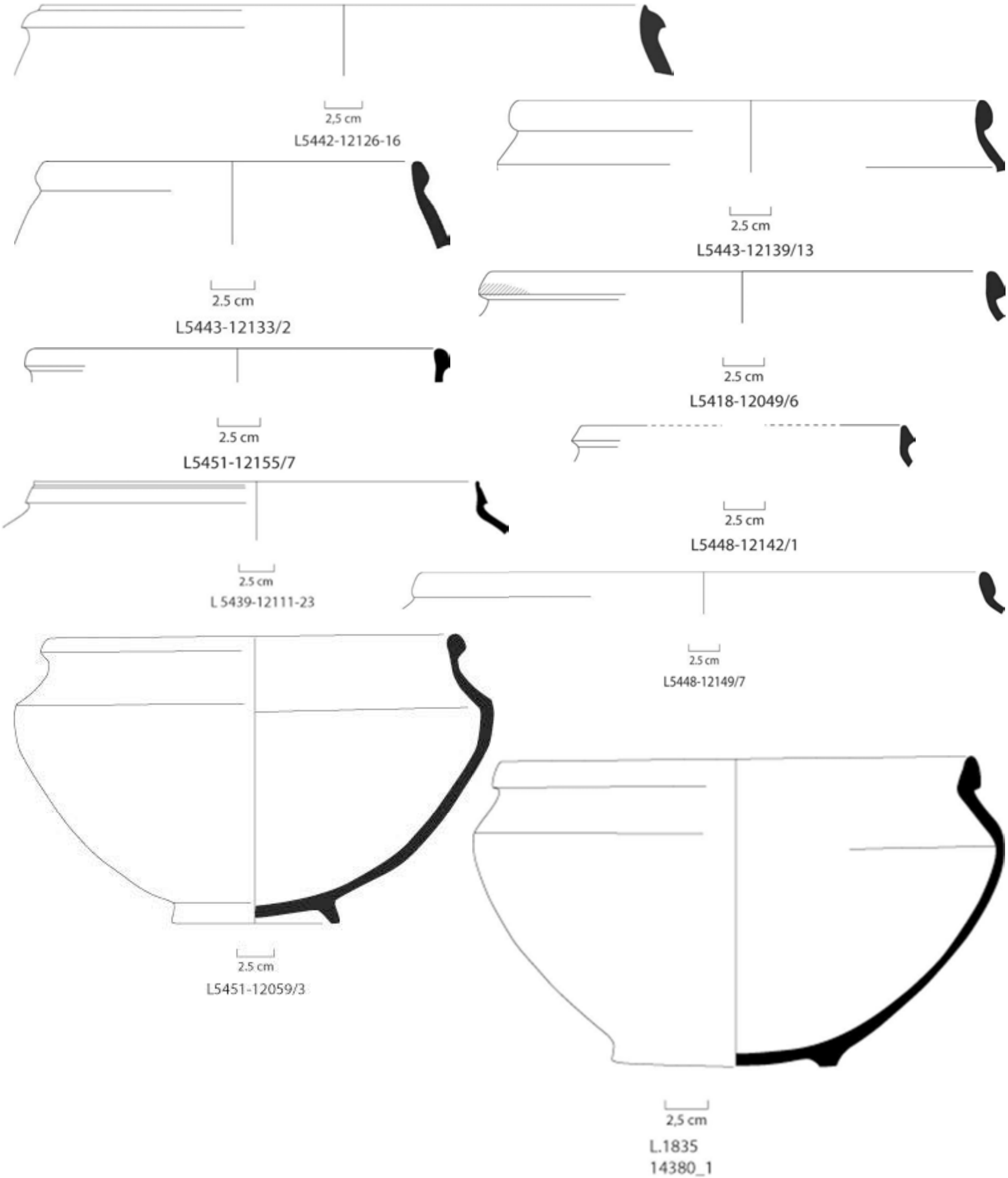

10262/1


2.5 cm
L4269-10416/1

Appendix 5D Kraters

KR04 Carinated Kraters									
Reg. no	Locus	Area-phase/ Stratum	Rim	width/ height cm	remarks	main temper	second temper	color	pres.
8681/1	5231	K1/IV	6E	44		basalt, much, small	chalk, little, coarse	surface & core: 10YR very pale brown 8/4	2
8871/3	5271	K1/IV	6E	33/17	traces of fire inside	basalt, much, small	chalk, little, coarse	surface: 5YR reddish yellow 7/8; core: 7.5YR pink 7/4	rest. 60%
10733/2	4326	U3B	6B5	31		basalt, much, medium	chalk, little, coarse	out: 5YR 6/6; in: 2.5YR 6/6; core: 10YR 6/3	2
10643/7	4312	U3B	5B	30		basalt, much, medium	chalk, medium, coarse	out: 2.5YR 6/6; in: 7.5YR 7/4 core: 10YR 5/2	1
10509/4	4276	U3B	6B	30	not illustrated	basalt, medium, medium	quartz, little, medium	surfaces: 2.5YR 6/6; core: 10YR 5/2	1-2
10310/2	4236	U3B	6B5	27	red 10R 5/4 (self) slip	basalt, medium, medium	organic, little, medium	out: 5YR 7/6; in: 5YR 7/8 core: N 5/0	1-2
10753/1	4326	U3B	6B5	31		basalt, much, medium	chalk, little, coarse	out: 5YR 6/6; in: 2.5YR 6/6 core: 10YR 6/3	2
10239/27	4218	U3B	11D	34	red 2.5YR 5/6 (self) slip	basalt, much, small	chalk, little, medium	surfaces: 5YR 6/6 core: N 4/0	1-2
10243/6	4218	U3B				basalt, little, medium	chalk, very little, coarse	surfaces: 2.5YR 6/8 core: 7.5YR 7/3	2
10243/23	4218	U3B	11C	29		basalt, much, small	chalk, medium, coarse	surfaces: 10YR 8/4 core: 10YR 6/3	1
10404/4	4268	U3A	6G3	25		quartz, little, small	sand, little, small	out: 7.5YR 7/4; in: 2.5YR 6/4 core: 7.5YR 4/4	1
10563/1	4285	U3A	11D	29		basalt, much, medium	chalk, very little, medium	out: 2.5YR 6/6; in: 2.5YR 6/4 core: 10YR 5/2	1-2
10410/3	4269	U0/U3	6H	33	not illustrated	basalt, much, medium	chalk, medium, coarse	surfaces: 5YR 6/6; core: 10YR 5/2	2
10416/2	4269	U0/U3	6B	33		basalt, much, small	chalk, little, medium	out: 5YR 6/6; in: 5YR 7/6; core: 7.5YR 6/4	rest. 2
10282/7	4228	U1	6G3	32		basalt, much, medium	chalk, medium, coarse	out: 2.5YR 6/6; in: 2.5YR 6/4 core: 2.5Y N4/	1
10262/1	4216	U0	6G3	27		basalt, much, medium	chalk, little, medium	surfaces: 5YR 7/4 core: 7.5YR 6/4	1
10947/2	4348	N3	3B	24		basalt, much, medium	chalk, medium, coarse	out: 2.5YR 6/8; in: 2.5YR 6/6 core: 10YR 5/3	1
12126/16	5442	W4	5B	32		basalt, medium, small	chalk, medium, coarse	out: 7.5YR 7/4; in: 10YR 7/3 core: 10YR 5/2	1
12133/2	5443	W2	3B	25		basalt, little, small	chalk, medium, medium	surfaces: 2.5YR 6/6; core: 7.5YR 4/1	1
12139/13	5443	W2	3	30		basalt, much, small	chalk, very little, medium	out: 7.5YR 7/4; in: 2.5YR 6/6; core: 10YR 6/3	1
12159/7	5451	W2	3	26		basalt, medium, medium	chalk, little, coarse	out: 2.5YR 6/6; in: 2.5YR 6/4; core: 10YR 5/2	1
12049/6	5418	W2	6B	27		quartz, little, medium	chalk, little, medium	surfaces: 2.5YR 6/4; core: 10YR 4/1	1
12111/23	5439	W2	5BB	26		basalt, much, medium	chalk, medium, coarse	out: 10YR 8/3; in: 5YR 7/8 core: 5YR 6/4	1
12142/1	5448	W1	6B	35		quartz, medium, coarse	chalk, little, coarse	surfaces: 10YR 8/4; core: 10YR 5/2	1

KR04 Carinated Kraters (cont.)

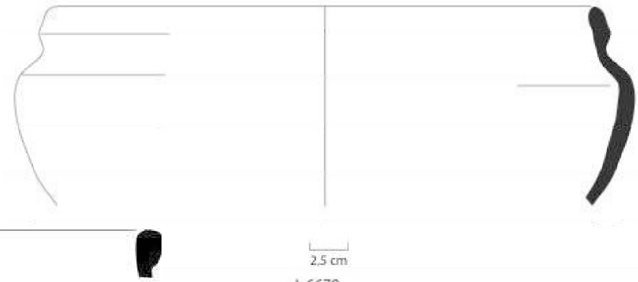


KR04 Carinated Krater

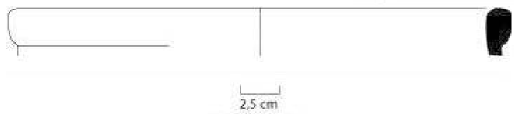
Reg. no	Locus	Area-phase/ Stratum	Rim	width/ height cm	remarks	main temper	second temper	color	pres.
12149/7	5448	W1	6F	30		basalt, medium, medium	quartz, little, medium	surfaces: 2.5YR 6/6; core: 7.5YR 6/4	1
12059/3	5415	W0	6B2	29		basalt, much, medium	chalk, medium, medium	out: 7.5YR 7/4; in: 2.5YR 6/6 core: 7.5YR 6/4	rest. 2
14380/1	1835	S	5B	27.5/19		basalt, much, medium	quartz, very little, coarse	surfaces: 7.5YR reddish yellow 7/6; core: 5Y dark gray 4/1	rest.

Appendix 5D Kraters

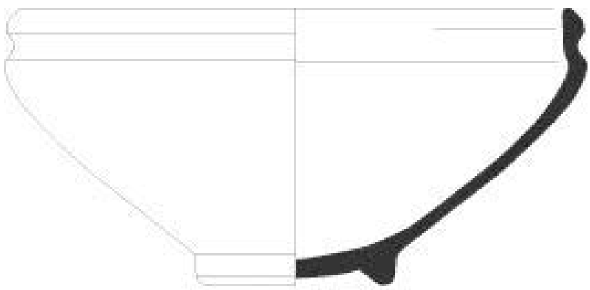
KR04 Carinated Kraters



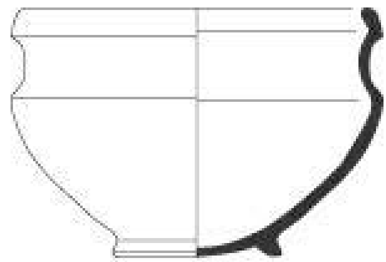
L.6679
14025_1



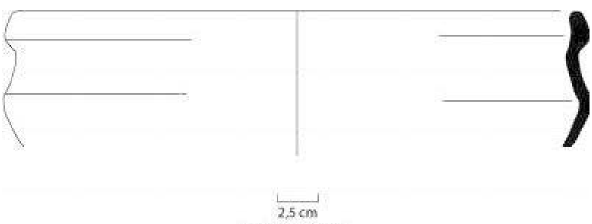
L6488-11573-3



diam. 45 cm 10140/1



diam. 24 cm 10130/1



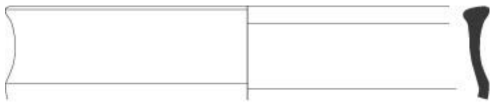
L3794-12630-1

L6473-11532-1

KR04 Carinated Krater									
Reg. no	Locus	Area-phase/ Stratum	Rim	width/ height cm	remarks	main temper	second temper	color	pres.
14025/1	6679	R2	11D	36		chalk, little, coarse	basalt, little, medium	out: 5YR reddish yellow 6/6; in: 2.5YR light red 6/6	2-3
11573/3	6488	R2	3	30		basalt, medium, small	chalk, little, coarse	-	1
10140/1	9012	T	5AB	45/22		basalt, much, small	chalk, little, medium	out: 2.5YR light red 6/6; in: 5YR yellowish red 5/6; core: 2.5Y N4 dark gray	rest. 3
10130/1	9012	T	11D	24/17.8		basalt, much, small	chalk, medium, medium	surfaces: 2.5YR 5/8 red; core: 7.5YR brown 5/4	3
12630/1	3794	S	11D	32		basalt, much, medium	chalk, little, medium	surfaces: 2.5YR light red 6/6; core: 10YR dark brown 4/3	2

KR05 Bell-shaped Kraters

10243/5=10239/10

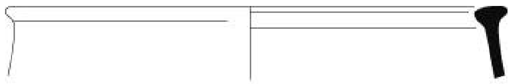


2.5 cm

L....-10239/10

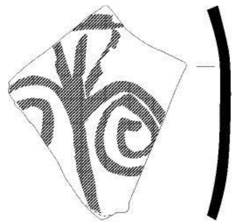
10311/1

10511/3



2.5 cm

L 5410-12040/6



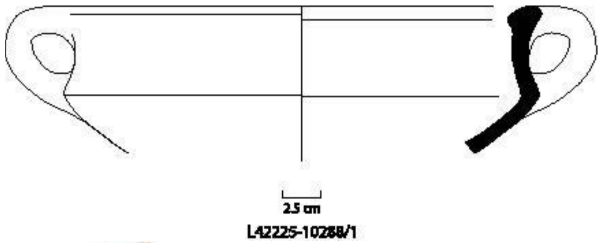
1 cm

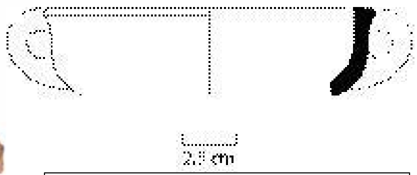
L5442-12116-7

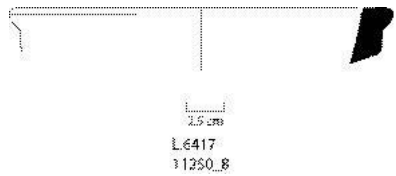
KR05 Bell-Shaped Kraters									
Reg. no	Locus	Area-phase	Rim	rim width cm	Surface	main temper	second temper	color	pres.
10243/5	4218	U3B	4	30	vestigial handle	basalt, much, medium	chalk, medium, coarse	surfaces: 5YR 7/6 core: 10YR 7/2	1
10311/1	4233	U3A	6G2	25	red (10R 5/6) painted decoration	basalt, much, medium	chalk, medium, coarse	out: 2.5YR 6/6 in: 5YR 6/6 core: 10YR 6/2	1
10511/3	4277	U3B	4B	25		quartz, little, medium	flint, very little, coarse	out: 2.5YR 6/6 in: 5YR 6/6 core: 10YR 5/3	1
12116/7	5442	W4	-	ca. 35	white slip, burnish, dark brown 10R 4/3 decoration	chalk, little, medium	basalt, little, coarse	out: 10YR white 8/2; in: 10YR 7/4; core: 10YR light gray 7/2	0
12040/6	5410	W0	4B	29		basalt, medium, small	chalk, little, coarse	surfaces: 10YR 8/4 core: 7.5YR 7/4	1

Appendix 5D Kraters

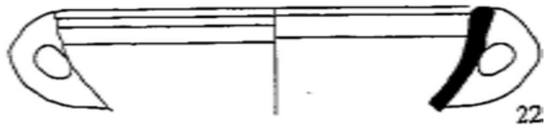
KR06A Shallow Bowl-Krater with Handles/Scoop

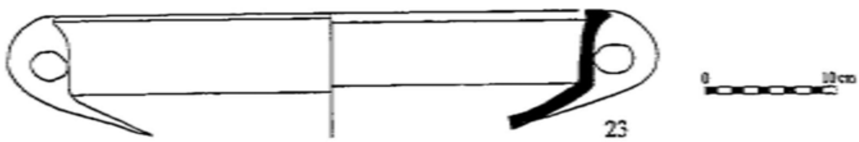






10029/5 (L9002), 36 cm wide



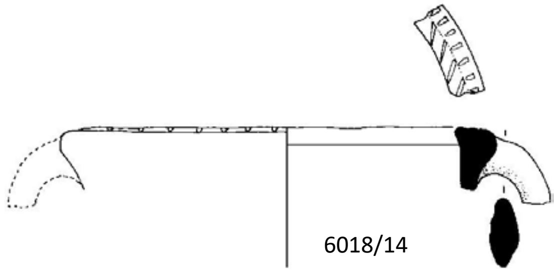


Wide, shallow Bowl-Kraters 9570/1, 9571/1, 9587/1 all from Stratum VII

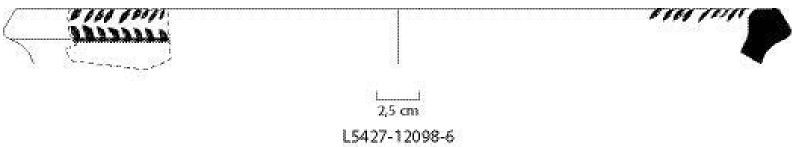
KR06A Shallow Bowl-Krater with Handles/Scoops

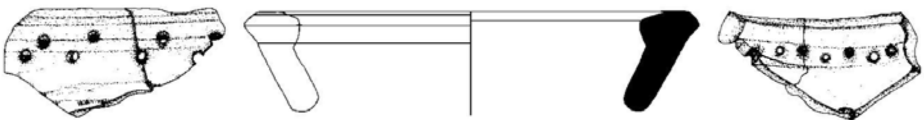
Reg. no	Locus	Area-phase/Str	Rim	Rim width/ height cm	Surface	main temper	second temper	color	pres.
9570/1	6195	R VII	3C	35–40/ 11–13	smoothed on the exterior	organic, medium, medium	chalk, little, small	surface: 5YR reddish yellow 6/6; core: 5YR gray 5/1	2
9571/1	6195	R VII	3	32/ 10–11	smoothed on the exterior	organic, medium, medium	sand, little, small	surface: 5YR reddish yellow 7/6; core: 7.5YR gray N 5	2
9587/1	6195	R VII	3H	44/ 11–13		organic, medium, medium	chalk, medium, coarse and medium	surface: 10YR very pale brown 8/3; core: 10YR very dark gray 3/1	2
10288/1	4225	U3B	2	28		basalt, much, medium	chalk, medium, coarse	surfaces: 5YR 7/6 core: 10YR 6/3	1
10029/5	9002	T1	3C	36		chalk, medium, coarse	sand, medium, medium	surfaces: 5YR reddish yellow 7/6; core: 5YR reddish yellow 6/6	2
11250/8	6417	R		21	worn	basalt, little, medium	chalk, little, medium	surfaces & core: 10YR very pale brown 8/4	1

KR06B Wide Kraters with Thick, Incised Rim

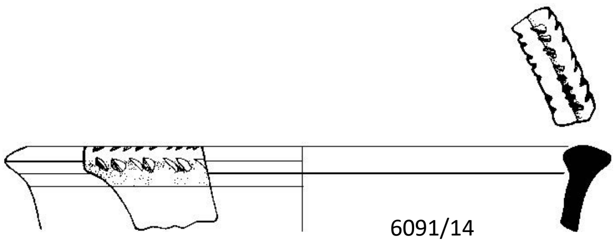


6018/14





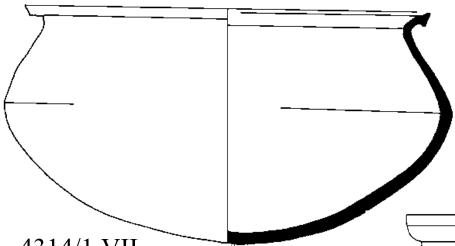
6851/1

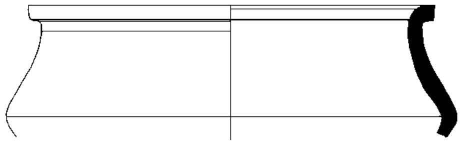


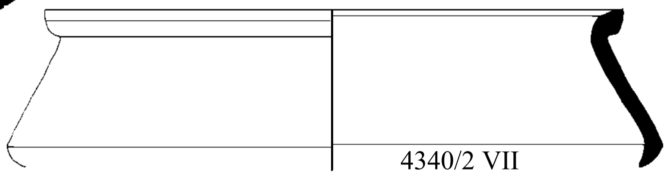
6091/14

KR06B Wide Kraters with Thick, Incised Rim									
Reg. no	Locus	Area-phase/ Stratum	Rim	rim width cm	Remarks	main temper	second temper	color	pres.
6018/14	3009	H2 / VI fill	3C	34	incised fish bone on rim	basalt, much, small	chalk, much, small	10YR very pale brown 8/4	1
12098/6	5427	W3	10	42	incised fish bone on rim	basalt, medium, coarse	chalk, little, coarse	surfaces: 7.5YR 7/3 core: 7.5YR 6/4	1
6851/1	3676	N1 / V	2B	42	drilled holes below rim	basalt, much, small	chalk, little, small	surface: 5YR pink 7/4; core: 5YR pinkish gray 6/2	1
6091/14	3023	H	4	34	incised fish bone on rim	dark minerals, much, medium	chalk, little, small	surface: 2.5Y pale yellow 8/4	1

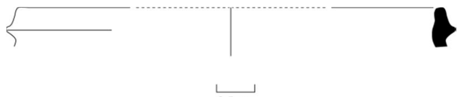
CP01 Cooking pots with everted upper part and triangular rim


4314/1 VII


4420/1 VII

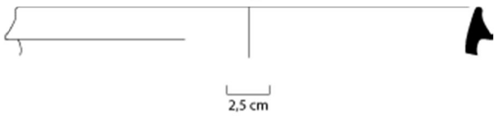

4340/2 VII


9103/1 VII

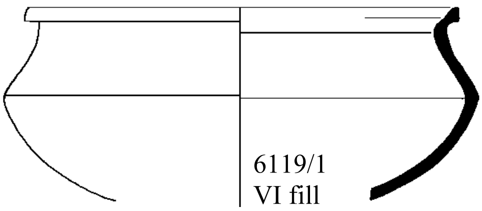


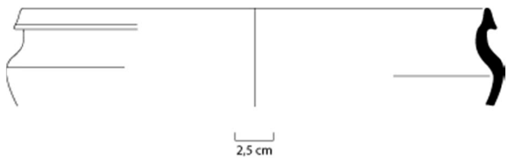
L.6417
11250_9


9018/2 VII



L5442-12126-8


6119/1
VI fill

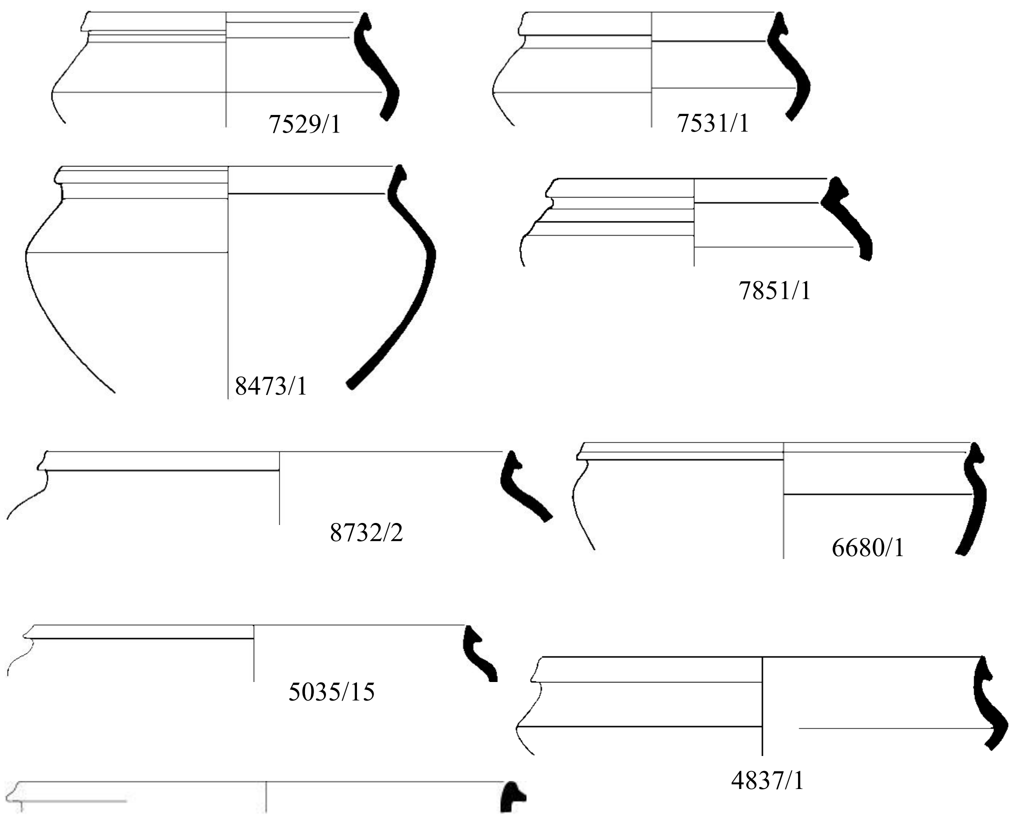


L5442-12126-15

CP01 Cooking Pots with everted upper part and triangular rim									
Reg. no	Locus	Area-phase/ Stratum	Rim type	rim width cm	Remarks	main temper	second temper	color	pres.
4314/1	3137	H3/VII	5B	30	brittle, traces of fire	quartz, much, small	small white grits	surface: 5YR reddish yellow; core: 2.5YR dark gray 4/1	rest. 80 %
4420/1	3137	H3/VII	5B	32		quartz, much, coarse & medium	small white and gray grits	surface: 2.5YR red 5/8; core: 10YR dark grayish brown 4/2	2
4340/2	3137	H3/VII	5B	49	traces of fire	quartz, little, coarse	big white grits	surface: 7.5YR light brown 6/4; core: 10YR gray 6/1	2
9103/1	6023	M2/VII	5B	21		quartz, much, small	small white grits	surface: 5YR light reddish brown 6/4; core: 10YR dark gray 4/1	2
9018/2	6010	M2/VII	5B	25	traces of fire	quartz, much, small	small white grits	surface: 5YR light reddish brown 6/4; core: gray	1
11250/9	6417	R6B	11D	29	traces of fire	quartz, little, medium	chalk, little, medium	surfaces: 2.5YR red 5/6 core: 5B bluish black 2.5/1	1
12126/8	5442	W4	5B	32		quartz, much, small	chalk, little, coarse	surfaces: 2.5YR 5/4; core: N 3/0	1
12126/15	5442	W4	5B	24	brittle	quartz, much, medium	chalk, very little, medium	out: 5YR 5/2; in: 7.5YR 5/2 core: 5Y 4/1	1
6119/1	3040	H2-3/ VII-fill of VI	5B	32	brittle	many small white grits	few big white grits	surface: 10R weak red 5/4	2

Appendix 5E Cooking Pots

CP01 Cooking pots with everted upper part and triangular rim



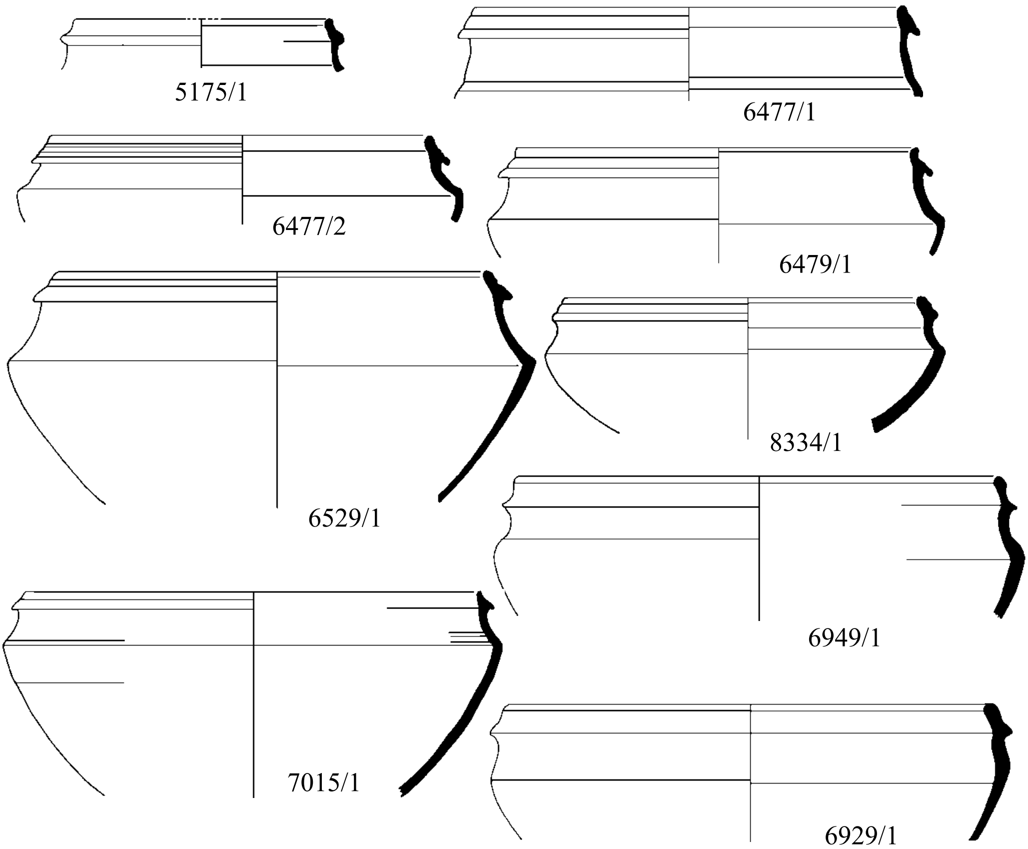
2,5 cm
L6479-11561-1

Note: the drawings are not (exactly) in scale!

CP01 Cooking Pots with everted upper part and triangular rim

Reg. no	Locus	Area-phase/ Stratum	Rim type	rim width cm	Remarks	main temper	second temper	color	pres.
7529/1	5133	K							1-2
7531/1	5143	K							1-2
7851/1	5316	K / V	5B	23	traces of fire	many small white grits	few big white grits	surface: 7.5YR brown 5/2; core 5YR gray 5/1	2
8473/1	5094	K / V	5B	28	traces of fire	organic temper	small white and gray grits	surface: 7.5YR reddish yellow 7/6; core: 10YR gray 5/1	2
6680/1	3621	N	5B	31	brittle, traces of fire	quartz, small	few big white grits	surface: 5YR reddish brown 4/3; core: 7.5YR dark gray N4	2
8732/2	5237	K / V							1-2
5035/15	2020	G							1-2
4837/1	1807	F3/V	5B	36		many gray and white small grits	big white grits	surface: 5YR reddish brown 5/3; core: 7.5YR dark brown 4/2	1
11561/1	6479	R	5B	32		quartz, medium, medium	chalk, little, medium		1

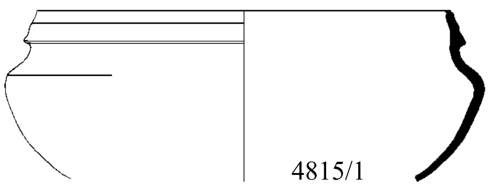
CP02A Cooking pots with inverted upper part and triangular rim



CP02A Cooking pots with inverted upper part and triangular rim								
Reg. no	Locus	Area-phase/ Stratum	Rim width (cm)	Remarks	main temper	second temper	color	pres.
5175/1	2078	G3 / VI	21		quartz, much, small	many small white grits	surface: 5YR light reddish brown 6/3; core: 7.5YR dark gray N4	1
6477/1	3531	N2 / VI	35	brittle	quartz, much, small	few big white grits	surface: 2.5YR light red 6/6; core: 10YR gray 5/1	1
6477/2	3531	N2 / VI	31	brittle, traces of fire	quartz, much, small	few big white grits	surface: 5YR yellowish red 5/6; core: 10YR dark gray 4/1	2
6479/1	3531	N2 / VI	32	brittle, traces of fire	quartz, much, small	few big white grits	surface: 5YR yellowish red 4/6; core: 10YR dark grayish brown 4/2	2
6529/1	3514	N2 / VI	35	traces of fire	quartz, much, small	very few big gray grits	surface: 5YR reddish yellow 6/6; core: 5YR dark gray 4/1	2
8334/1	5076	K3 / VI	29		quartz, much, small	small white and gray grits	surface: 5YR reddish yellow 6/6; core: 10YR dark grayish brown 4/2	2
6949/1	3705	S / V	39	traces of fire	many white small grits	few big white grits	surface: 5YR reddish brown 5/3; core: 10YR dark gray 4/1	1
6929/1	3711	S / V	40	traces of fire	many white small grits	-	surface: 5YR light reddish brown 6/3; core: 2.5YR gray N5	1
7015/1	3729	S / V	37	traces of fire	many white small grits	few big white grits	surface: 5YR yellowish red 5/8; core: 10YR dark gray 4/1	2

Appendix 5E Cooking Pots

CP02A Cooking pots with inverted upper part and triangular rim								
Reg.no	Locus	phase/str	width	Remarks	small grits	big grits	color	pres.
4815/1	1803	F3 / V	34 cm	traces of fire	many white small	few big white grits	surface: 2.5YR red 5/8; core: 2.5YR dark gray N4	2
4815/2	1803	F3 / V	37		many white and gray small grits	few big gray and white grits	surface: 2.5YR red 5/6; core: 10YR grayish brown 5/2	2
6770/1	3656	N1 / V	33	traces of fire	quartz, much, small	very few big gray grits	surface: 7.5YR dark brown 3/2; core: 7.5YR very dark gray N3	rest. 80 %
6787/2	3656	N1 / V	49		quartz, much, small	very few big gray grits	surface: 2.5YR red 5/6; core: 7.5YR very dark gray N3	2
7165/1	4060	J1 / V	25		quartz, much, small	few big gray and white grits	surface: 2.5YR reddish brown 5/4; core: 5YR dark gray 4/1	1-2
7426/2	4159	J1 / V	41		quartz, much, small	-	5YR light reddish brown 6/4	rest. 3
7687/2	5277K	K 2-3 / V	31		quartz, small	organic	surface: 5YR reddish yellow 6/6; core: 10YR very dark gray 3/1	2
7687/3	5277K	K 2-3 / V	36		quartz, much, small	few big white grits	surface: 5YR reddish yellow 6/6; core: gray	1-2
7687/4	5277K	K 2-3 / V	31	sooted	quartz, much, small	few big gray grits	surface: 7.5YR reddish yellow 6/6; core: 7.5YR dark gray N4	2
8194/1	5038	K 2-3 / V	31	brittle, sooted	many white small	few quartz grits	surface & core: 5YR dark gray 4/1	2
8195/1	5051	K2 / V	33	brittle, sooted	quartz, much, small	few big white	surface: 2.5YR reddish brown 5/4; core: 10YR dark gray 4/1	1
8463/3	5088	K2 / V	27	sooted	quartz, much, small	white small grits	surface: 10R dark reddish gray; core: 2. 5YR very dark gray N3	1
8715/1	5079	K3 / V	42		few white and gray	few big white & brown grits	surface: 7.5YR reddish yellow 6/6; core: 10YR dark gray 4/1	rest. 60 %
8715/2	5079	K3 / V	29		quartz, much, small	white and gray small grits	surface: 5YR reddish yellow 6/6; core: 7.5YR reddish yellow 7/6	1
9036/1	6011	M1 / V	29	brittle, traces of fire	quartz, much, small	few white small grits	surface: 5YR reddish brown 5/3; core: 5YR dark gray 4/1	2
9575/2	6143	R / V	34	brittle, traces of fire	quartz, small	few big white grits	surface: 2.5YR reddish brown 5/4; core: 10YR very dark gray 3/1	2-3
9579/2	6143	R / V	32	brittle, traces of fire	quartz, much, small	few big white grits	surface: 2.5YR reddish brown 5/4; core: gray	2
9238/1	6106	R / V	33	brittle, sooted	quartz, much, small	few big white grits	surface: 2.5YR red 5/6; core: 5YR dark gray 4/1	rest. 90%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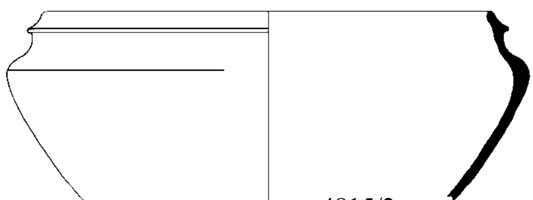
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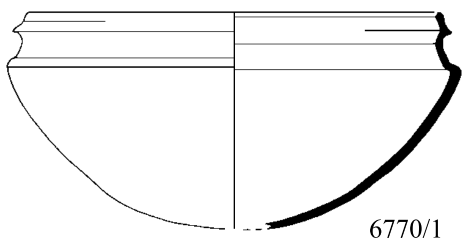
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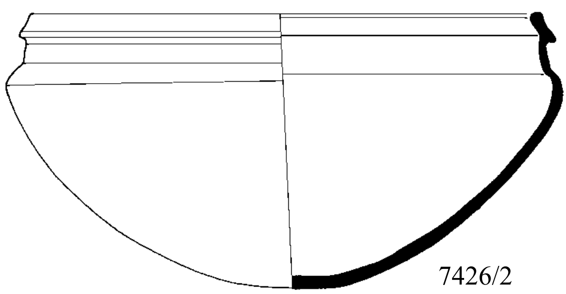
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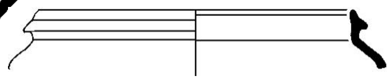
CP02A Cooking pots with inverted upper part and triangular rim

6787/2



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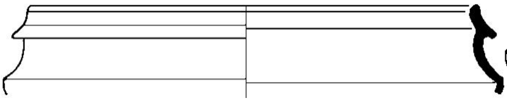

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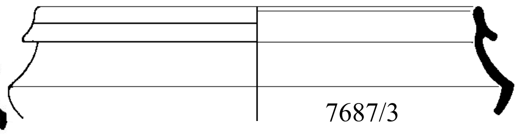

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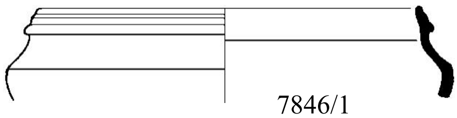

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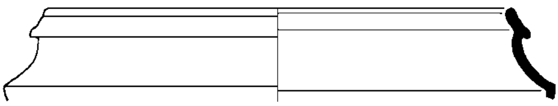

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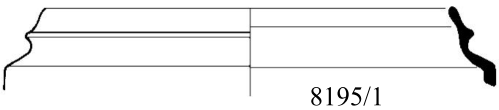

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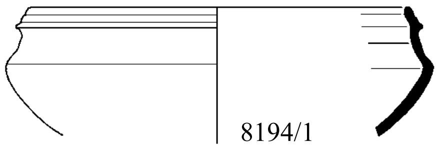

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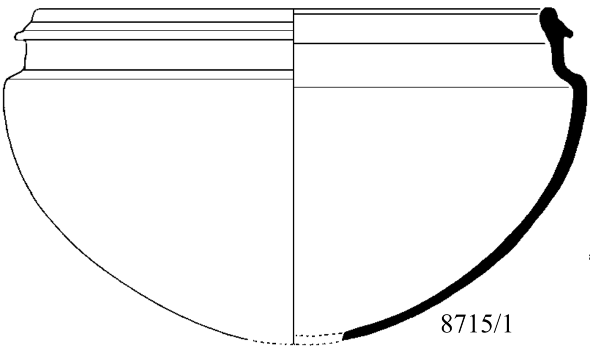

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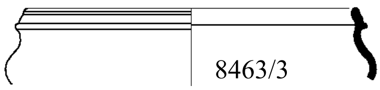

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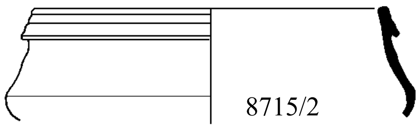

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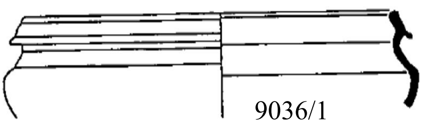

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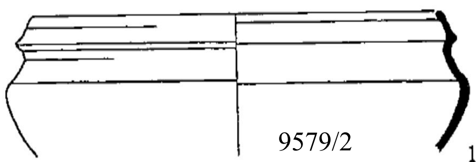

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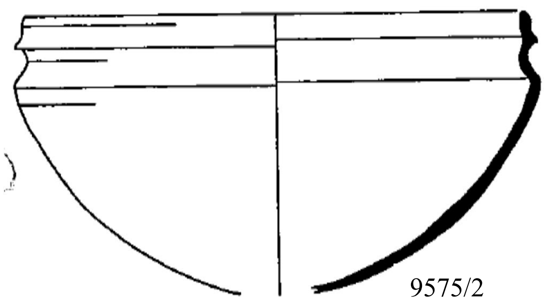

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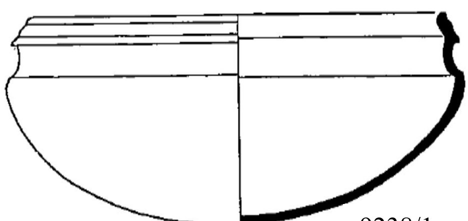


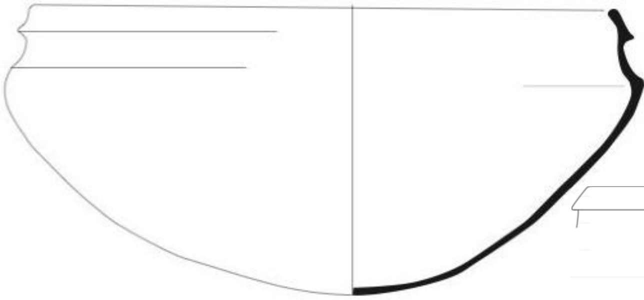
9238/1

Appendix 5E Cooking Pots

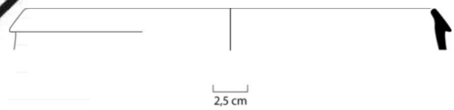
CP02A Cooking pots with inverted upper part and triangular rim

Reg.no	Locus	area-phase	rim type/ width cm	Remarks	small grits	big grits	color	pres.
10787/2	4328	U3B	6B3/ 50	brittle	quartz, much, medium	-	out: 2.5YR 4/3; in: 2.5YR 5/4 core: N 3/0	rest. whole
10674/10	4312	U3B	6B3 / 37		quartz, much, medium	chalk, little, medium	surfaces: 5YR 6/4 core: 10YR 3/1	1
10557/1	4287	U3B	8 / 30	brittle	quartz, much, small	-	surfaces: 2.5YR 6/4; core: 2.5YR 5/4	1
10679/1	4303	U3A	6E / 37		quartz, much, medium	-	surfaces: 2.5YR 5/4 core: 5YR 4/1	1
10609/4	4303	U3A	6B3 / 40		quartz, much, small	-	out: 2.5YR 5/6; in: 2.5YR 5/4 core: 5YR 4/3	1
14405/1	1849	S	6B3 / 38	traces of fire	quartz, much, med.	-	out: 2.5YR 4/3; in: 2.5YR 5/6; core: 10YR very dark gray 3/1	2-3
11578/2	6492	R	6B3 / 34	sooted	quartz, much, med.	chalk, little, med.	-	1
12127/1	5443	W2	7 / 28	brittle, sooted	quartz, much, medium	chalk, very little, medium	surfaces: 2.5YR 6/4 core: N 4/0	2
12127/9	5443	W2	7 / 34	sooted	quartz, medium, medium	-	surfaces: 2.5YR red 5/6 core: 5Y very dark gray 3/1	rest. 2-3
12139/8	5443	W2	11D / 30		quartz, medium, medium	-	out: 5YR 6/4; in: 2.5YR 5/4 core: 2.5Y 4/1	1
12182/2	5458	W2	7 / 28		quartz, medium, medium	chalk, little, medium	out: 2.5YR 5/4; in: 2.5YR 6/4 core: N 3/0	rest. 2-3
12055/1	5418	W2	6E / 30	sooted	quartz, much, coarse	chalk, little, medium	surfaces: 2.5YR 5/6; core: 2.5Y 4/1	1-2
12070/2	5423	W2	6B3 / 28		quartz, much, medium	chalk, little, medium	out: 2.5YR 6/4; in: 5YR 6/3 core: 2.5Y 4/1	1
12073/4	5423	W2	6B3 / 26	sooted	quartz, much, medium	chalk, little, medium	out: 7.5YR 5/2; in: 5YR 5/4 core: 5Y 3/1	1
12073/11	5423	W2	6B / 35		quartz, much, medium	chalk, little, medium	surfaces: 2.5YR 5/4; core: N 3/0	1
12073/8	5423	W2	6E / 35	sooted	quartz, much, medium	chalk, very little, medium	out: 5YR 5/4; in: 2.5YR 5/4 core: 5YR 4/1	1
12089/5	5423	W2	6B3 / 29		quartz, medium, medium	chalk, very little, medium	out: 5YR 6/4; in: 2.5YR 6/4 core: 10YR 3/1	1
12080/2	5423	W2	6E / 40		quartz, much, medium	chalk, very little, medium	out: 5YR 6/4; in: 2.5YR 6/4 core: N 4/0	1
12082/1	5423	W2	6B2 / 34		quartz, medium, medium	basalt, little, medium	surfaces: 5YR 5/4 core: N 3/0	1
12075/5	5423	W2	6B / 27		quartz, medium, medium	sand, little, medium	surfaces: 5YR 5/6 core: 7.5YR 4/1	1
12074/5	5427	W3	6E / 36		quartz, much, medium	basalt, little, medium	out: 10R 5/4; in: 2.5YR 5/4 core: 2.5Y 4/1	1
12099/1	5433	W2	6B3 / 23	brittle	quartz, medium, medium	chalk, very little, medium	out: 2.5YR 5/3; in: 2.5YR 5/4 core: 7.5YR 4/1	1
12099/2	5433	W2	6B2 / 25	brittle, sooted	quartz, medium, medium	-	out: 5YR 6/3; in: 10YR 5/1 core: 5YR 4/1	1
12111/19	5439	W2	6B3 / 35		quartz, medium, medium	chalk, very little, medium	surfaces: 2.5YR 5/4 core: 2.5Y 4/1	1
12111/16	5439	W2	6C / 31		quartz, medium, medium	chalk, little, medium	out: 5YR 5/3; in: 2.5YR 5/4 core: N 3/0	1
10230/3	4207	U2	6B5 / 30	sooted	quartz, medium, medium	organic, medium, small	surfaces: 5YR 5/6 core: 10YR 5/1	1
10230/4	4207	U2	6B3 / 32		quartz, much, medium.	chalk, med., medium.	surfaces & core: 5YR 5/4	1

CP02A Cooking pots with inverted upper part and triangular rim [cont.]



2,5 cm
L.4328
10787_2



2,5 cm
L.10674_10

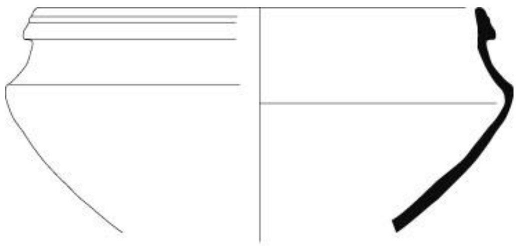
2,5 cm
L.10609_4

2,5 cm
L4287-10557-1

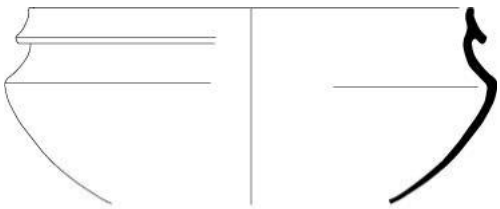
2,5 cm
L.10679_1

2,5 cm
L.1849
14405_1

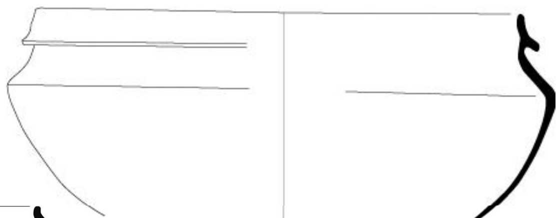
2,5 cm
L6492-11578-2



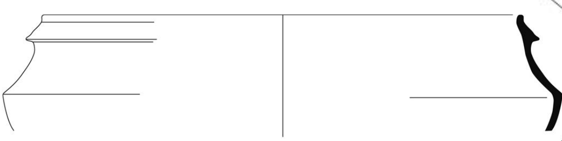
2.5 cm
L5458-12182/2



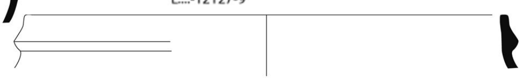
2,5 cm
L5443-12127-1



2,5 cm
L....-12127-9

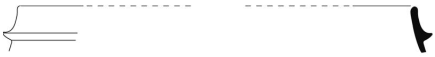


2.5 cm
L5418-12055/1



2.5 cm
L5443-12139/8

CP02A Cooking pots with inverted upper part and triangular rim [cont.]



2.5 cm

L5423-12070/2

2.5 cm

L5423-12073/8

2.5 cm

L5423-12073/4

Drawing should be inverted!

2.5 cm

L5423-12073/11

2.5 cm

L5423-12073/5 Note: should be inverted

2.5 cm

L5423-12089/5

2,5 cm

L5427-12074-5

2.5 cm

L5433-12099/1

2.5 cm

L5423-12080/2

2.5 cm

L5433-12099/2

2.5 cm

L5423-12082/1

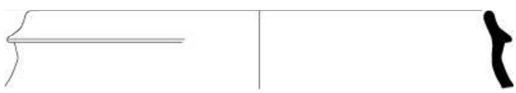
2.5 cm

L 5439-12111-19

2.5 cm

L 5439-12111-16

Drawing should be inverted!

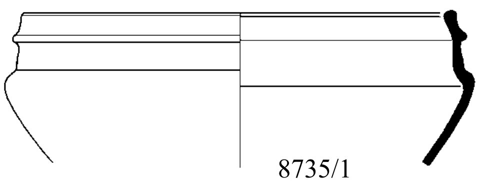


2,5 cm

L4207-10230-4

2,5 cm

L4207-10230-3



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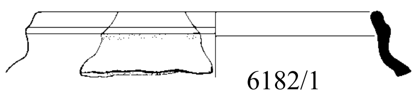

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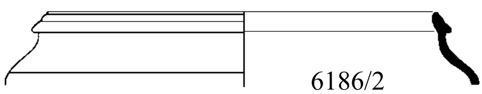
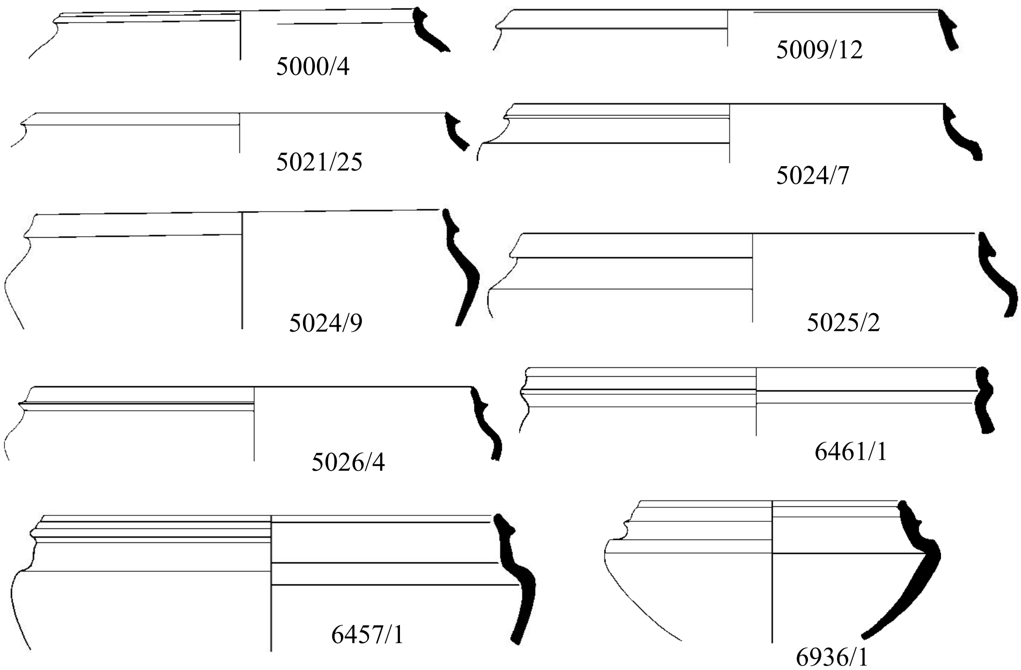


6186/2

CP02A Cooking pots with inverted upper part and triangular rim [cont.]

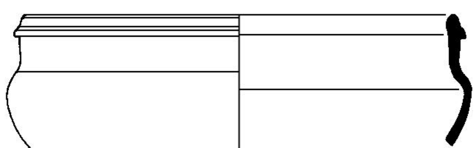


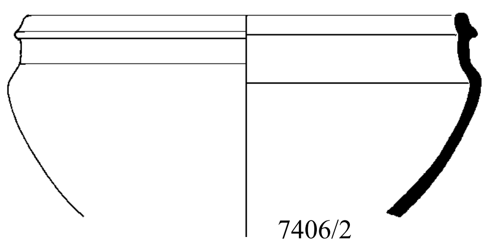
CP02A Cooking pots with inverted upper part and triangular rim [cont.]

Reg. no	locus	Area-phase	rim width cm	remarks	small grits	big grits	color	pres.
8735/1	5240	K1 / IV	35	brittle, traces of fire	many small gray	-	surface: 5YR reddish brown; core: 10 YR very dark gray	2
6186/1	3039	H0	28		quartz, much, small	few big white grits	surface: 5YR reddish gray 5/2; core: 7.5YR dark brown 4/2	1
6186/2	3039	H0	31		quartz, much, small	few big white grits	surface: 2.5YR light red 6/6; core: 5YR reddish yellow 6/6	1
5000/4	2000	G0	28	brittle	many small and big white grits	few small and big black grits	surface: 2.5YR red 5/6; core: 2.5YR dark gray N4	1
5009/12	2005	Gp	35		many small white grits	few big white grits	surface: 5YR reddish brown 5/4; core: 10YR dark gray 4/1	1
5021/25	2011	G0	33		many gray and black, few white small grits	few big white grits	surface: 2.5YR red 5/8; core: 7.5YR pinkish gray 6/2	1
5024/7	2011	G0						1
5024/9	2011	G0	33		many gray small grits	few big white grits	surface: 2.5YR red 4/8; core: 7.5YR brown 5/2	2
5025/2	2014	Gp	38		many small white, few black grits	few big white grits	surface: 7.5YR light brown 6/4; core: 7.5YR dark gray N4	1-2
5026/14	2014	Gp	36		many gray small grits	few big gray grits	surface: 5YR reddish brown 5/4; core: 2.5YR dark gray N4	1
6461/1	3515	N1 / V	37	traces of fire	quartz, small	small white grits	5YR reddish brown 5/4	1
6936/1	3716	N						2
6457/1	3510	N	37	brittle, traces of fire	quartz, much, small	small white grits	surface: 2.5YR reddish brown 5/4; core: 2.5Y dark gray N4	2

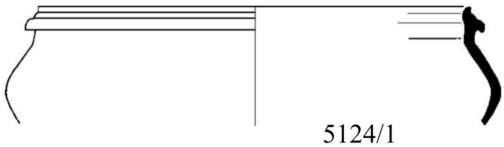
CP02B Cooking pots with upright upper part and pinched rim

Reg. no	Locus	Area-phase/ Stratum	width (cm)	Remarks	main temper	second temper	color	pres.
7406/1	4162	J1 / VI	35	traces of fire	quartz, much, small	many small white grits	surface: 5YR light reddish brown 6/3; core: 7.5YR dark gray N4	2
7406/2	4162	J1 / VI	35		quartz, much, small	many small white grits, few big white grits	surface: 2.5YR light red 6/6; core: 2.5YR red 5/6	2
5124/1	2050	G2 / V	34	brittle	quartz, much, small	organic temper	surface: 2.5YR red 5/6; core: 7.5YR dark gray N4	2
5126/1	2050	G2 / V	31		quartz, much, small	many small black and white grits	surface: 2.5YR light red 6/8; core: 7.5YR reddish yellow 6/6	2
7238/11	4096	J1 / V	31	traces of fire	quartz, much, small	many small white grits	surface: 10R red 5/6; core: 5YR dark gray 4/1	2
7372/1	4149	J1 / V	35	brittle	quartz, much, small	many small white grits	surface: 2.5YR light red 6/6; core: 7.5YR very dark gray N3	2
7359/1	4085	J2 / V	31	brittle, traces of fire	quartz, much, small	many small and few big white grits	surface: 2.5YR reddish brown 5/4; core: 7.5YR very dark gray N3	2
7413/1	4159	J / V	33		quartz, much, small	many small white grits	surface: 5YR reddish brown 5/4; core: 10YR dark gray 4/1	2
7429/1	4155	J1 / V	39	shards from different loci	quartz, much, small	many small and few big white grits	5YR reddish yellow 6/6	rest. 90 %
7500/1	5132	K2 / V	29	brittle, traces of fire	very many white and gray small grits	few big white grits	surface: 2.5YR light red 6/6; core: 10YR dark gray 4/1	1
7687/1	5277K	K / V	31	brittle	quartz, small	organic temper	surface: 5YR reddish yellow 6/6; core: 10YR very dark gray 3/1	1
7687/5	5277K	K / V	37	sooted, brittle	quartz, much, small	many small and few big white grits	surface: 5YR light reddish brown 6/4; core: 10YR dark grayish brown 4/2	1-2
8078/5	5027	K / V	37		many white small grits	few gray small grits	5YR reddish yellow 7/6	1
8078/7	5027	K / V	31	brittle	quartz, much, small	many white small grits	surface: 5YR reddish brown 4/3; core: 7.5YR dark gray N4	2
8216/7	5027	K / V	37	brittle	quartz, much, small	many white small grits	surface: 5YR light reddish brown 6/4; core: 5YR dark reddish gray 4/2	1
8135/3	5042	K / V	29		quartz, small	very small white grits	surface: 2.5YR light red 5/6; core: 2.5YR red 5/6	1
8707/1	5237	K2 / V	33	sooted	quartz, much, small	many small and few big white grits	surface: 2.5YR red 5/6; core: 5YR dark gray 4/1	1-2
8732/1	5237	K2 / V	27	sooted, brittle	quartz, much, small	many gray small grits, few big white grits	surface: 5YR reddish brown 5/3; core: 10YR dark gray 4/1	1-2

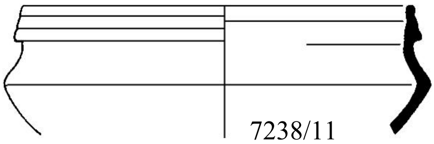

7406/1


7406/2

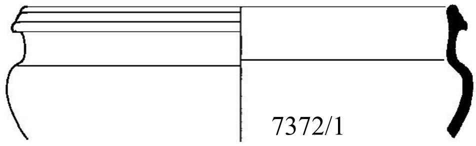
CP02B Cooking pots with upright upper part and pinched rim



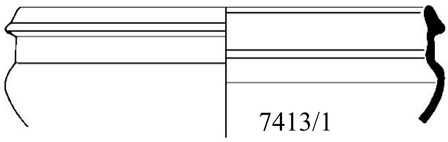
5124/1



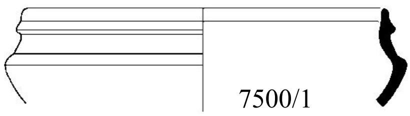
7238/11



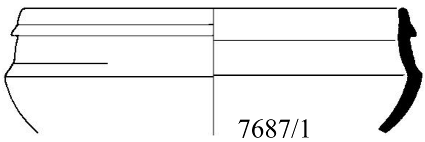
7372/1



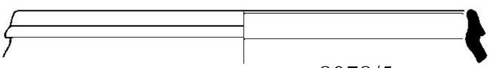
7413/1



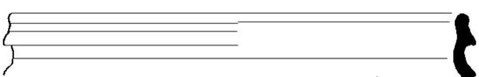
7500/1



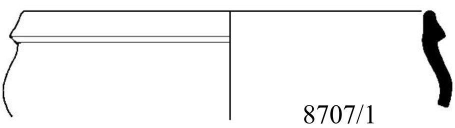
7687/1



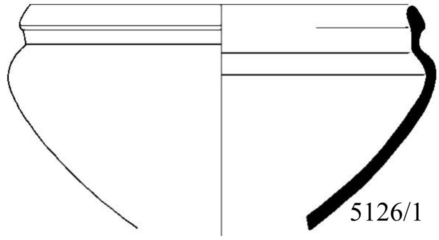
8078/5



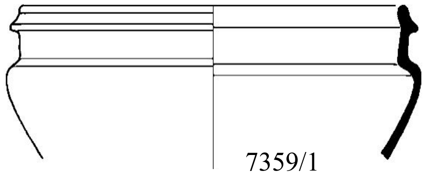
8216/7



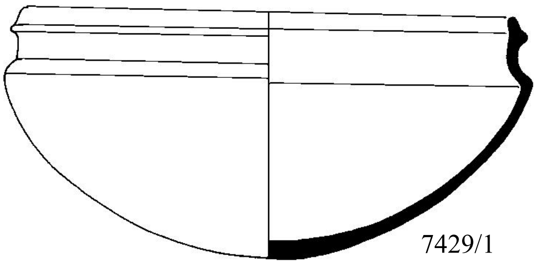
8707/1



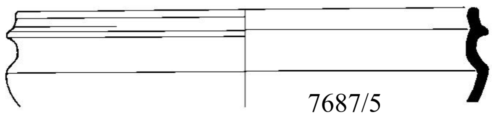
5126/1



7359/1



7429/1



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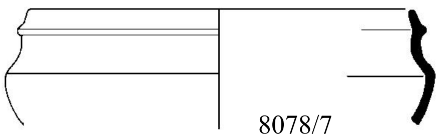
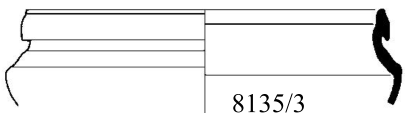
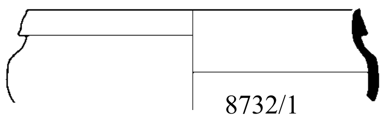


8078/7



8135/3

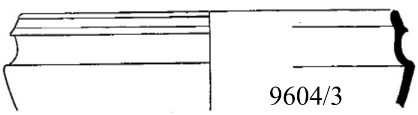


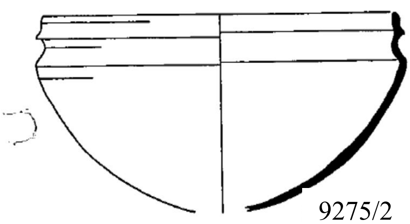
8732/1

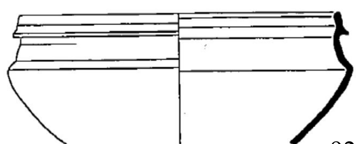
Appendix 5E Cooking Pots

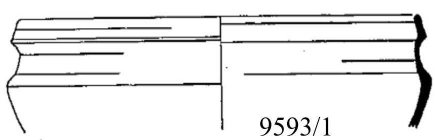
CP02B Cooking pots with upright upper part and pinched rim								
Reg. no	Locus	Area/ Stratum	Rim type /width cm	Remarks	main temper	second temper	color	pres.
9275/1	6115	R/V	/37	traces of fire, brittle	very many white small grits	-	surface: 5YR reddish brown 5/3; core: 7.5YR dark gray N4	1-2
9575/2	6115	R/V	/35	traces of fire, brittle	quartz, small	few big white grits	surface: 2.5YR reddish brown 5/4; core: 10YR very dark gray 3/1	2-3
9604/3	6178	R/V	/39	traces of fire	quartz, small and big	organic temper	surface: 2.5YR light reddish brown 6/4; core: 7.5YR pink 7/4	1-2
9268/1	6105	R/V	/33	traces of fire, brittle	quartz, much, small	many small gray and white grits	surface: 5YR reddish brown 5/3; core: 10YR dark gray 4/1	2
9593/1	6143	R/V	/37	traces of fire, brittle	many black and white small grits	-	surface: 7.5YR dark brown 4/2; core: 7.5YR gray N5	2
9621/1	6197	R/V	/43	traces of fire	quartz, much, small	many small white grits	surface: 2.5YR light red 6/6; core: 5YR reddish yellow 6/	2
9579/1	6143	R/V	/34	traces of fire, brittle	quartz, much, small	many small black and white grits	surface: 5YR reddish brown 5/4; core: 2.5YR dark gray N4	2
9279/2	6106	R/V	/40	traces of fire, brittle	quartz, much, small	-	surface: 2.5YR light red 6/6; core: 7.5YR dark gray N4	rest. 50%
11075/10	9904	R 4B	6B5 / 41.5	sooted; 21 cm high	basalt, much, medium	quartz, medium, medium	surfaces: 5YR reddish brown 5/3; core: 5YR black 2.5/1	3
10308/24	4244	U3B	6E / 26		quartz, much, medium	-	out: 5YR 5/4; in: 2.5YR 5/6 core: 10YR 3/1	2
10607/1	4301	U3B	11D / 29	sooted	quartz, much, medium	chalk, very little, coarse	out: 10YR 4/1; in: 7.5YR 6/3 core: 10YR 4/1	1
10631/1	4303	U3A	5B / 18	sooted	quartz, much, medium	-	out: 2.5YR 5/4; in: 5YR 6/4; core: 10YR 3/1	rest. whole
10557/2	4287	U3B	6B5 / 32	sooted	quartz, much, medium	-	out: 7.5YR 6/4; in: 5YR 6/4 core: N 3/0	1
10756/1	4328	U3B	6B3 / 33		quartz, much, small	-	out: 10YR 6/3; in: 2.5YR 5/6 core: 5YR 5/4	2
10756/5	4328	U3B	8 / 35	traces of fire	quartz, much, small	-	out: 5YR 4/3; in: 7.5YR 4/2 core: N 3/0	2
14256/1	1768	S0	6B / 21	traces of fire	quartz		out: 2.5YR 5/4; in: 10R red 5/6; core: 10YR very dark gray 3/1	2
12098/7	5427	W3	11D / 30	traces of fire	quartz, much, medium	chalk, very little, coarse	out: 2.5YR 5/3; in: 7.5YR 4/2 core: N 4/0	1

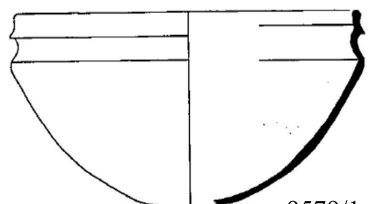

9275/1


9604/3

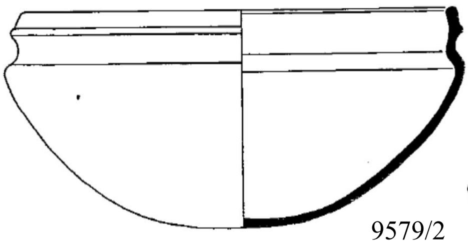

9275/2


9268/1

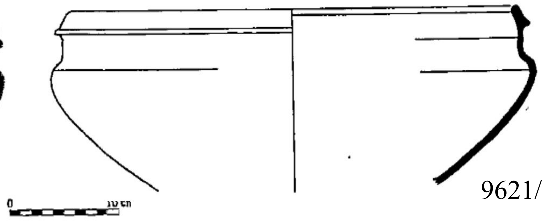

9593/1


9579/1

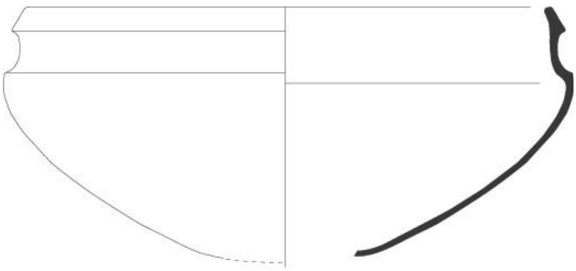
CP02B Cooking pots with upright upper part and pinched rim



9579/2

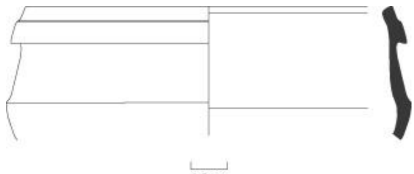


9621/1



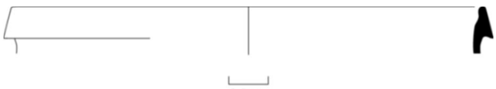
2.5 cm

L......-11075/10



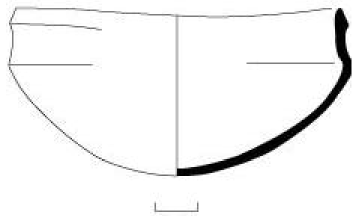
2.5 cm

L4244-10308/24



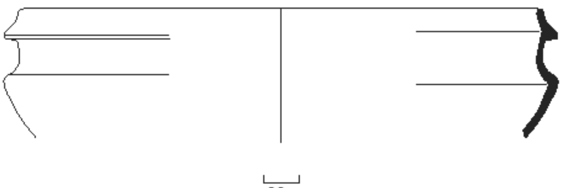
2,5 cm

L.10607_1



2,5 cm

L4303-10631-1



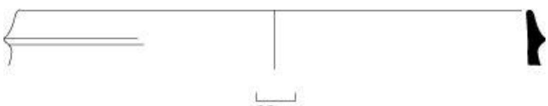
2,5 cm

10756_1

10756/5 (L4328) not drawn

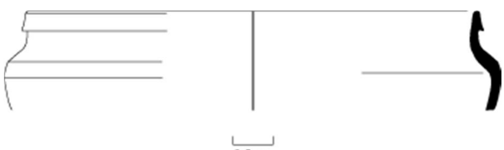
2,5 cm

L.14256_1



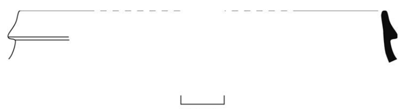
2,5 cm

L4287-10557-2



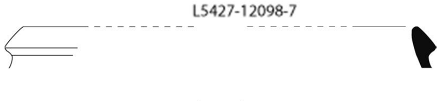
2,5 cm

L5427-12098-7



2.5 cm

L5423-12073/1



2.5 cm

L5423-12073/12

2,5 cm

L6473-11538-2

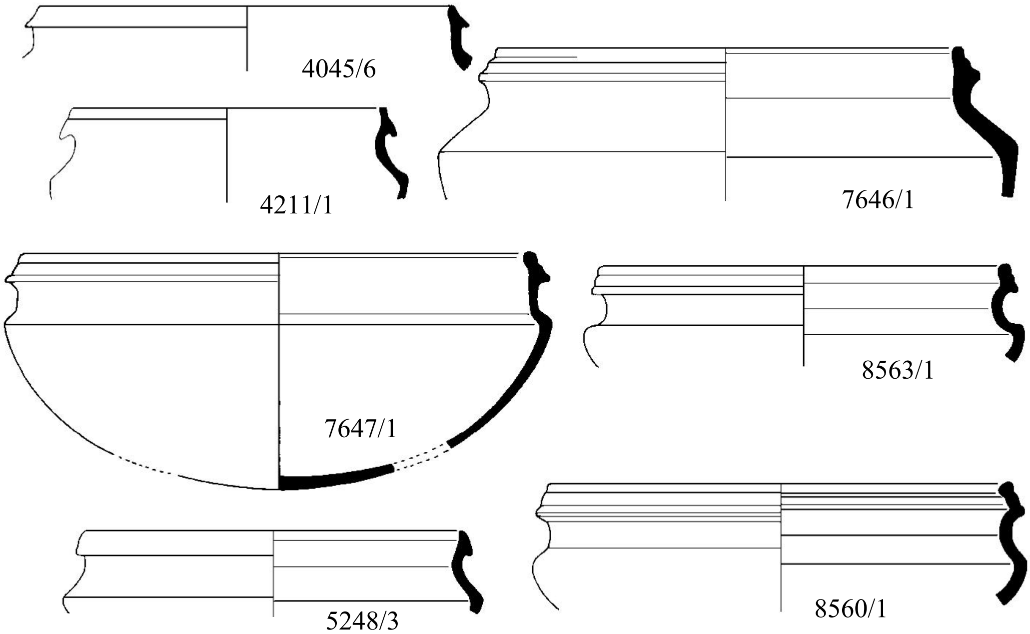
2,5 cm

L4207-10260-4

2,5 cm

L4207-10267-2

CP02B Cooking pots with upright upper part and pinched rim



CP02B Cooking pots with upright upper part and pinched rim								
Reg. no	Locus	Area/ Stratum	Rim type /width cm	Remarks	main temper	second temper	color	pres.
12073/1	5423	W2	11D / 26		quartz, much, coarse	chalk, little, coarse	surfaces: 2.5YR 5/4 core: 10YR 3/1	1
12073/12	5423	W2	11D / 42		quartz, much, medium	-	out: 5YR 5/4; in: 2.5YR 5/4 core: 7.5YR 4/1	1
11538/2	6473	R	6I / 36		quartz, much, medium		out: 2.5YR 5/4; in: 10R weak red 5/4; N very dark gray 3/0	1
10260/4	4207	U2	8 / 28	sooted	sand, medium, medium	organic, medium, small	surfaces: 5YR 5/4 core: 7.5YR N4/	1
10267/2	4207	U2	8 / 36		sand, medium, medium	chalk, little, medium	surfaces: 5YR reddish brown 5/4; core: 5YR dark gray 4/1	1
4045/6	1215	E2 / IV	/ 33		many white and gray small grits	few white big grits	surface: 5YR light reddish brown 6/3; core: 7.5YR dark brown 4/2	1
7646/1	5277K	K1 / IV	/ 34	brittle, traces of fire	quartz, much, small	many small and few big white grits	surface: 2.5YR light red 6/6; core: 10YR dark gray 4/1	2
8560/1	5116	K1 / IV	/ 37	brittle, traces of fire	quartz, much, small	few white big grits	surface: 2.5YR reddish brown 4/4; core: 5YR gray 5/1	2
8563/1	5118	K1 / IV	/ 33	brittle, traces of fire	quartz, much, small	few white and gray big grits	surface: 5YR dark reddish gray 4/2; core: 2.5YR dark gray N4	1-2
7647/1	5266K	K / IV	/ 41	brittle, sooted	quartz, much, small	-	surface: 2.5YR reddish brown 5/4; core: 10YR dark gray 4/1	rest. 65 %
10267/2	4207	U2	8 / 36		sand, medium, medium	chalk, little, medium	surfaces:5YR reddish brown 5/4; core: 5YR dark gray 4/1	1
4211/1	3105	H	/ 25		many small white grits	-	surface: 5YR light reddish brown 6/4; core: 5YR black 3/1	1-2
5248/3	2088	G						

CP02A Cooking pots with inverted upper part and triangular rim


CP02A 10292/7


CP02A 11195/15


CP02A 10462/1


CP02A 10284/3


CP02A 10863/8

CP02B Cooking pots with upright upper part and pinched rim

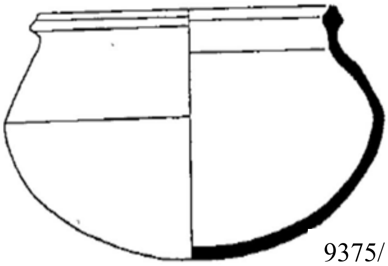

CP02B 10946/2


CP02B 10305/3

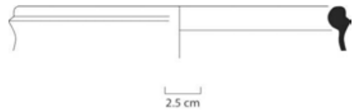
CP02A Cooking pots with inverted upper part and triangular rim								
Reg.no	Locus	area-phase	rim type/ width cm	Remarks	main temper	second temper	color	pres.
10292/7	4217	U2	11D / 26		quartz, medium, medium	sand, much, medium	surfaces: 2.5YR 6/4; core: N very dark gay 3/0	1
11195/15	9958	R	/ 22		quartz, much, medium	chalk, much, medium	out: 5YR 6/4; in: 7.5YR 6/4; core: 5Y 3/1	1
10462/1	4269	U0/U3	6C / 36		quartz, medium, medium	chalk, little, medium	out: 10R 5/4; in: 10R 5/6; core: 5Y black 2.5/1	1
10284/3	4227	U3B	6B / 30		quartz, much, medium	sand, little, medium	out: 5YR 5/3; in: 5YR 5/4; core: 10YR 3/1	1
10863/8	4343	U3B	6B / 35	traces of fire	quartz, much, small	-	out: 10YR 5/3; in: 5YR 4/2; core: 2.5Y 3/1	1
CP02B Cooking pots with upright upper part and pinched rim								
10946/2	4348	N3	6B3 / 45	traces of fire, brittle	quartz, much, small	-	surfaces: 2.5YR 5/4; 5YR black 3/1	1
10305/3	4225	U3B	5J / 35		quartz, much, medium	chalk, little, medium	surfaces: 5YR 5/3; core: 5YR 4/4	1

Appendix 5E Cooking Pots

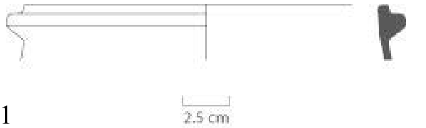
CP03 Cooking pots with restricted opening and grooved rim



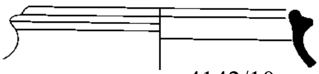
9375/1



L 5439-12111/35

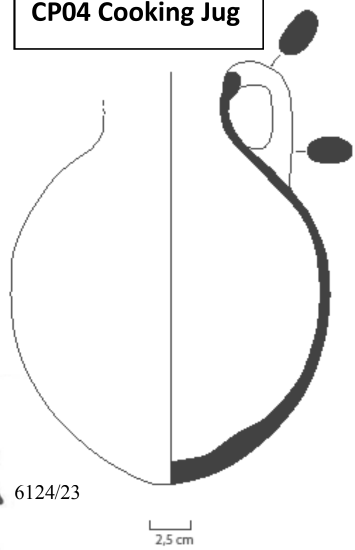


L9918-11099/1



4142/10

CP04 Cooking Jug



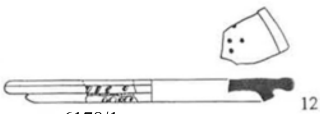
10691_1

Note: the drawings are not (exactly) in the same scale!

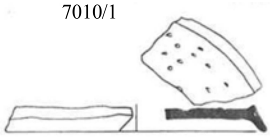
BT01 Flat, low cylinder formed baking trays

6098/22

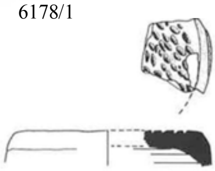
7010/1



6178/1

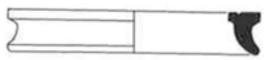


6124/23

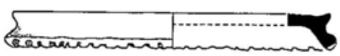


9046/2

6179/3



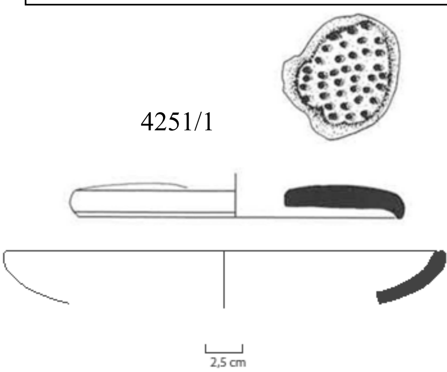
6158/2



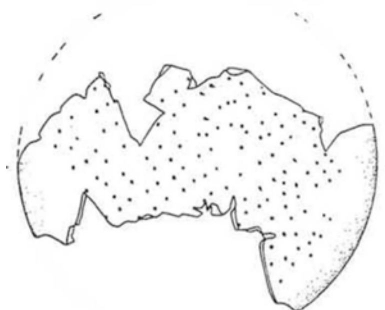
9386/1

BT02 Shallow, rounded baking trays

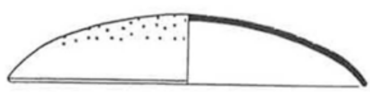
4251/1



10519_2



6761/3



CP03 Cooking pots with restricted opening and grooved rim

Reg. no	Locus	Area-phase/ Stratum	Rim type /width (cm)	Remarks	main temper	second temper	color	preserv.
9375/1	6132	R / V	/ 21		quartz, much, small and big	many small gray grits	surface: 5YR reddish yellow 7/6; core:7.5YR strong brown 5/6	restored 60 %
12111/35	5439	W2	6F / 18		quartz, medium, medium	-	out: 10R 4/6; in: 10R 5/6 core: 5YR 4/2	1
11099/5	9918	R	6E / 30		sand, medium, medium	organic, medium, small	out: 5YR 6/4; in: 7.5YR 6/4; core: 7.5YR 5/4	1
4142/10	1242	Epost	/ 20	traces of fire	quartz, much, small	many small white and gray grits	surface: 5YR reddish brown 5/3; core10YR dark brown 4/3	1

CP04 Cooking Jug

Reg. no	Locus	Area-phase/ Stratum	Rim type /width (cm)	Remarks	main temper	second temper	color	preserv.
10691/1	4301	U3B	5AB/ ca. 16	traces of fire	quartz, much, small	-	surfaces: 2.5YR 5/4; core: 10YR 3/1	restored 90 %

BT01 Flat, Cylindrical Baking Trays

Reg. no	Locus	Area-phase/ Stratum	width (cm)	Remarks	main temper	second temper	color	pres.
6098/22	3043	H2 / fill of VI	30	brittle, rod-impressions	many small white and gray grits	white and gray big grits	10R light red 6/6	1
6124/23	3043	H2 / fill of VI	25	brittle, rod-impressions	many small white grits	few white big grits	5YR reddish gray 5/2	1
6178/1	3047	H2 / fill of VI	28	brittle, rod-impressions and indents on rim	many small white and gray grits, few big white grits	tempered with straw	surface: 2.5YR red 5/6; core: 5YR reddish brown 5/4	1
6179/3	3047	H2 / fill of VI	28	brittle, thumb impressions	quartz, small	few white big grits	2. 5YR reddish brown 5/4	1
6158/2	3047	H2 / fill of VI						1
9386/1	6144	R	34	indents on rim	very small black and white grits	few white and gray big grits	surface: 2. 5YR light reddish brown 6/4; core: gray	1
9046/2	6017			rod impressions				1
7010/1	3731			rod impressions				0

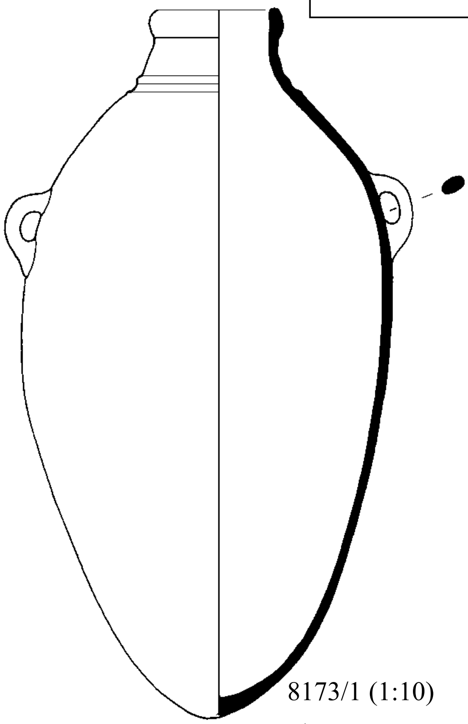
BT02 Shallow, Rounded Baking Trays

Reg. no	Locus	Area-phase/ Stratum	rim type/ width (cm)	Remarks	main temper	second temper	color	preserv.
10519/2	4283	U3B	2B / 26	joining fragments from L4328	quartz, much, medium	-	out: 5YR 4/2; in: 2.5YR 5/4 core: 7.5YR 3/1	2
4251/1	3108	H						1
6761/3	3656	N1 / V	rounded/ 28	rod/stick impressions	very many small white grits	few white big grits	surface: 5YR dark reddish brown 3/3; core: 10YR very dark gray 3/1	2

Appendix 5F Pithoi

PT01A Collared Pithoi with High Neck									
Reg. no	Locus	Area-phase/ Stratum	Rim	Rim width cm	remarks	small grits/ main temper	big grits/ second temper	color	preserv.
8173/1	5041	K / V		20	handmade, wheel-marks on neck	many white and black small grits	big white grits	5YR reddish yellow 7/6	restored 3
8200/1	5042	K2 / V			handmade, wheel-marks on neck	many gray and white small grits	many big white grits	surface: 2.5Y light gray 7/2; core: 7.5YR pink 7/4	restored 2-3
8237/1	5041	K / V		20	handmade; wheel-marks on neck, rope impression on shoulder	many gray and white small grits	big white grits	10YR very pale brown 7/3	restored 3
14459/1	1785	S		20	110 cm high, 57.5 cm wide	many black, medium grits	very few, big quartz grits	surfaces & core: 10YR very pale brown 7/4	restored 2-3
14220/2	1757	S		30	traces of pale slip 7.5YR 8/3	many small black grits	some big, white grits	out: 5YR reddish yellow 6/6 ; in: 10YR 6/4; core: 10YR 6/2	rim-neck
12124/1	5443	W2	3D	18		basalt, much, medium	-	out: 2.5YR 6/6; in: 5YR 6/4; core: 10YR 4/2	1
12080/1	5423	W2	3F	16		basalt, much, small	chalk, very little, coarse	surfaces: 7.5YR 7/4 core: 2.5Y 4/1	1-2
12178/1	5458	W2	3F	18		basalt, much, medium	chalk, little, medium	out: 2.5YR 6/8; in: 7.5YR 6/4; core: 10YR 5/2	1
12081/1	5423	W2	3E	20		basalt, much, small	chalk, little, medium	out: 10YR 8/3; in:10YR 7/3 core: 10YR 6/3	1-2
12098/3	5427	W3	3F	16		basalt, much, medium	chalk, little, coarse	out: 5YR 6/6; in: 5YR 6/4 core: 10YR 4/2	1
5180/1	2078	G3 / VI		17	wheel-marks on the neck	many white and black small grits	few big white grits	surface: 10YR yellow 7/6; core: 10YR gray 5/1	2
5140/1	2050	G2 / V	3E	15	wheel-marks on the neck	black, brown, and white small grits	many gray, brown and white big grits	surface: 7.5YR reddish yellow 7/6; core: 7.5YR reddish yellow 6/6	1-2
5155/1	2050	G2 / V		18	wheel-marks on the neck	many white and gray small grits	few big white grits	surface: 7.5YR pink 8/4; core: 7.5YR light brown 6/4	2
5132/2	2050	G2 / V		21	wheel-marks on the neck	many brown, white, and gray small grits	few big white grits	surface: 2.5YR light red 6/8; core: 10YR light yellowish brown 6/4	2
10237/5	4219	U1	3E	200	wheel-marks	basalt, much, coarse	chalk, medium, medium	out: 5YR 6/6; in: 7.5YR 7/4; core: 7.5YR 6/4	2
PT01B Collared Pithoi, Short Necked									
4076/1	1225	E2 / IV	3I	10		many small gray, white, and quartz grits	many big white and quartz grits	surface: 10YR yellowish brown 5/6; core: 10YR pale brown 6/3	2

PT01A Collared Pithoi with High Neck



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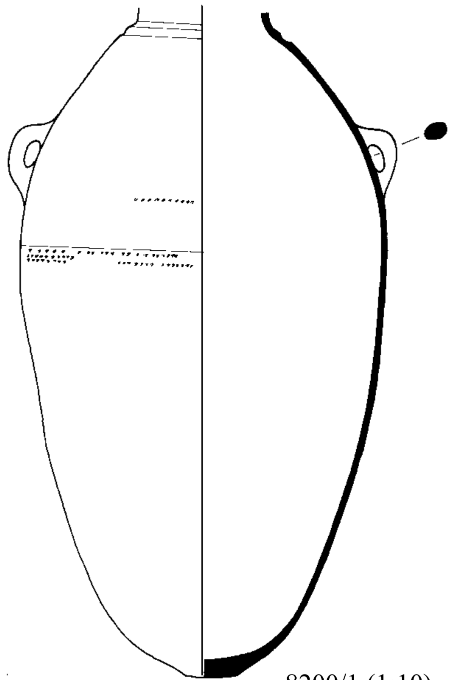

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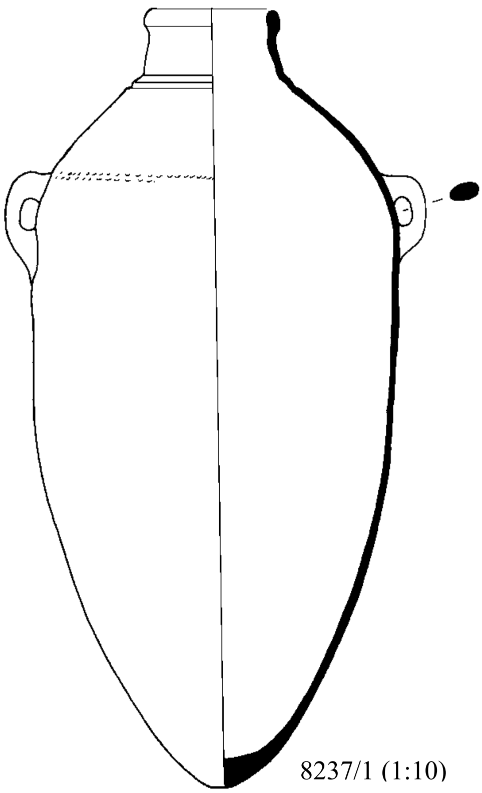

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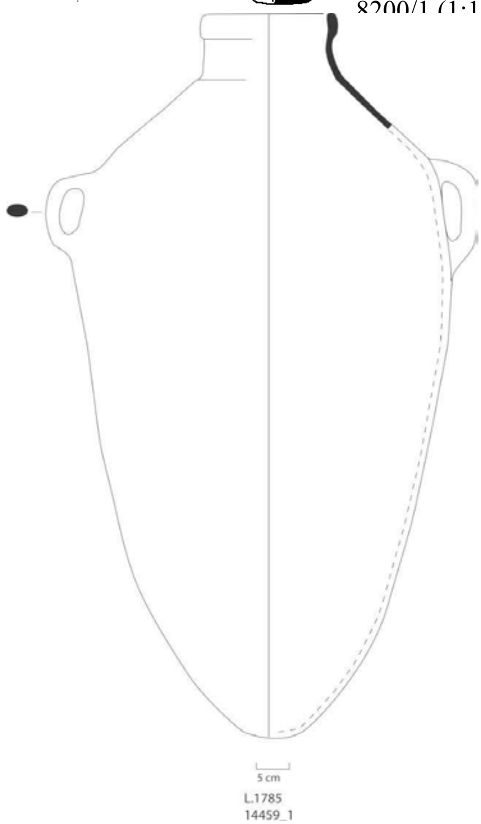
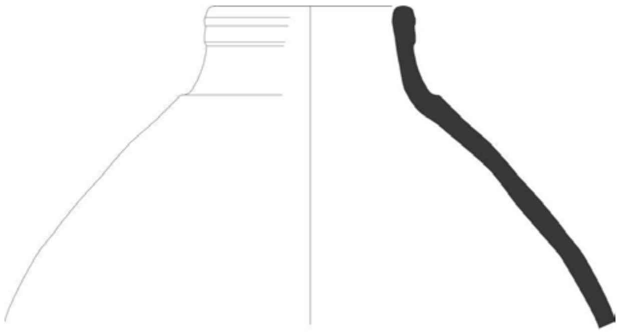
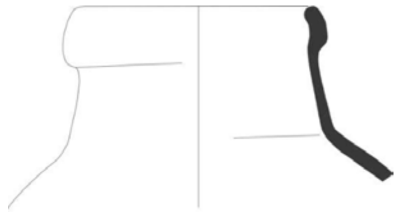


PT01A Collared pithoi, high necked



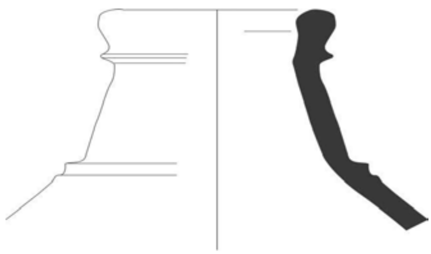
2,5 cm

L5423-12080-1



2,5 cm

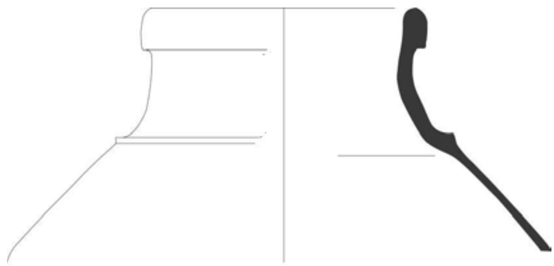
14220_2



2,5 cm

L5423-12081-1

Note: diameter is 20 cm!

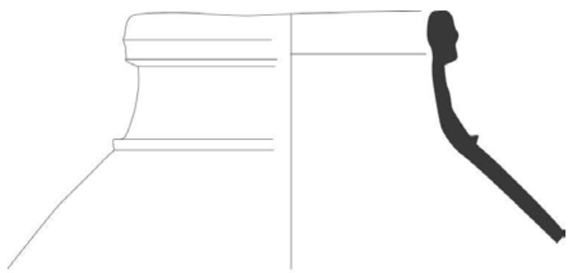


2,5 cm

L5443-12124-1

2,5 cm

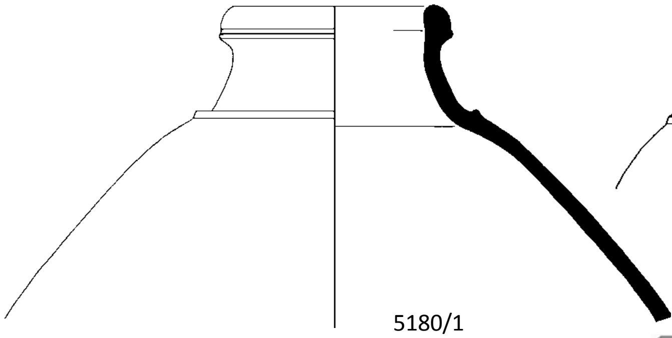
L5427-12098-3



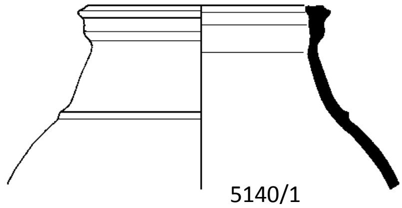
2.5 cm

L3438-12178/1

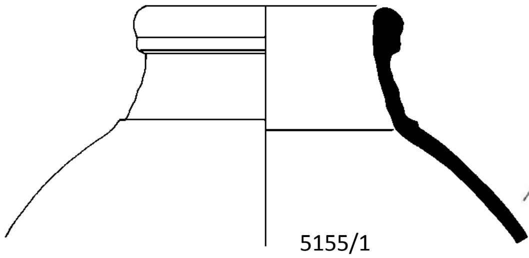
PT01A Collared pithoi, high necked



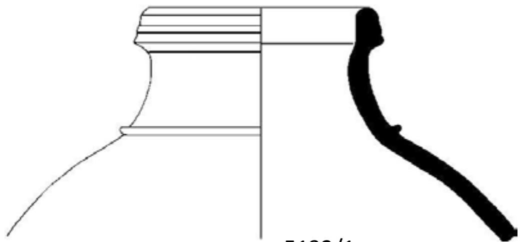
5180/1



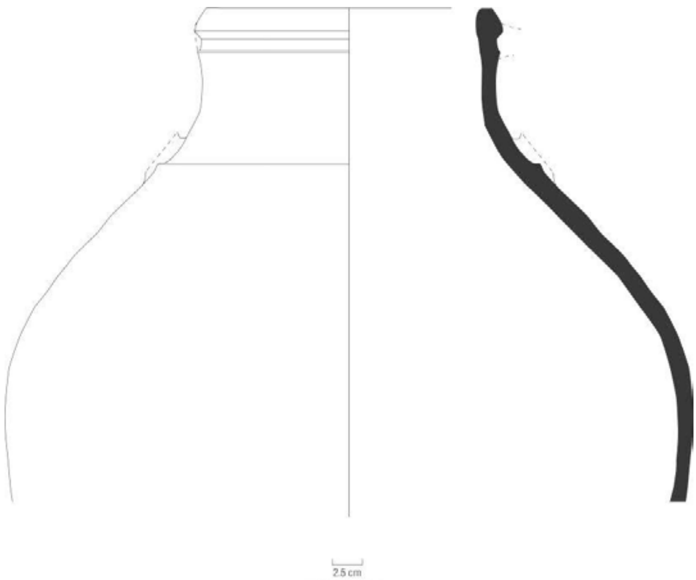
5140/1



5155/1

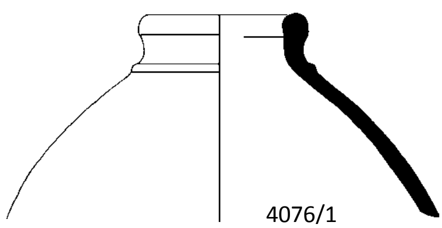


5132/1



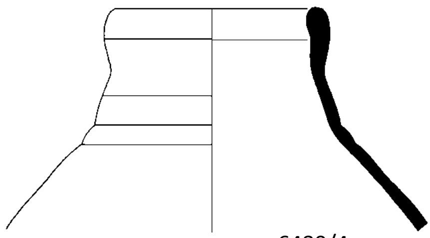
L4219, 10237/5

PT01B Collared Pithoi, Short Necked

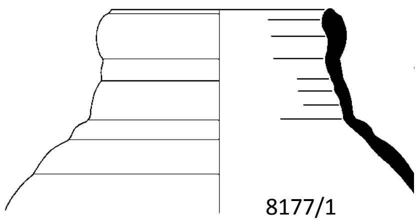


4076/1

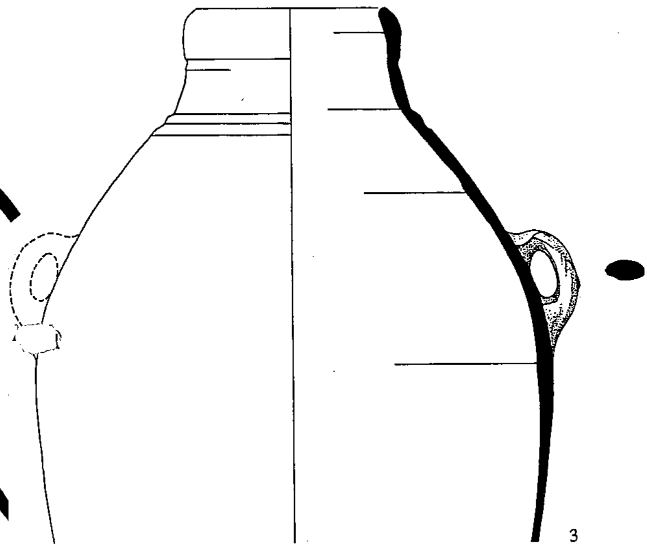
PT01C Pithoi with Inverted Neck and Sloping Shoulder



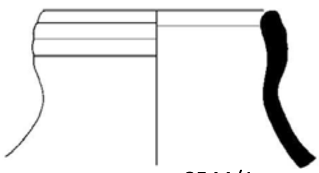
6480/4



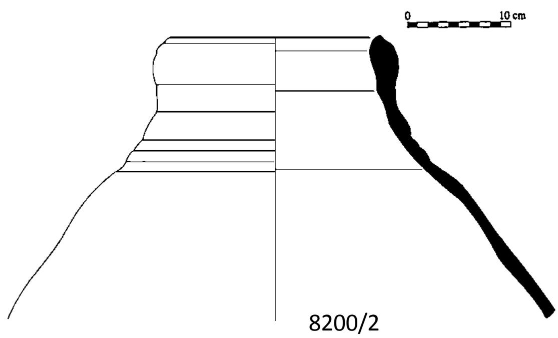
8177/1



9591/1



8544/1



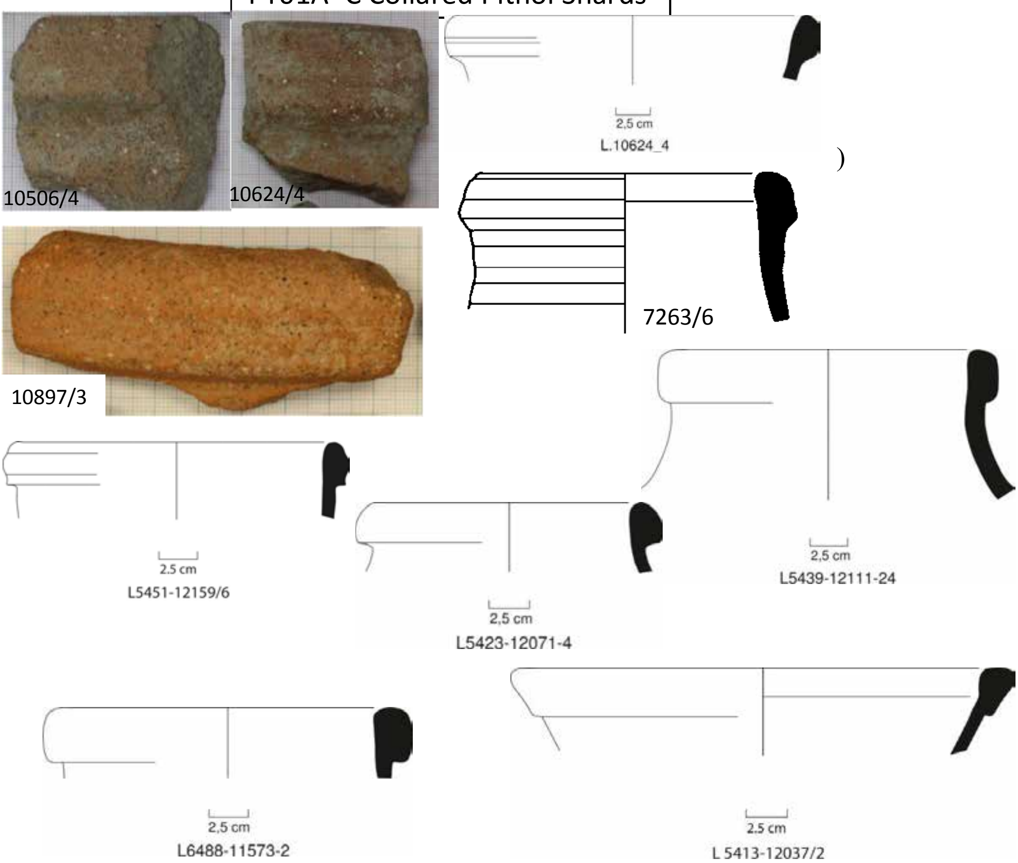
8200/2

PT01C Pithoi with Inverted Neck and Sloping Shoulder								
Reg. no	Locus	Area-phase/ Stratum	Rim width cm	remarks	small grits/ main temper	big grits/ second temper	color	preserv.
6480/4	3531	N2 / VI	18	wheel-marks on the neck	black and white small grits	few big white and gray grits	surface: 10YR yellow 7/6; core: 10YR grayish brown 5/2	1-2
8544/1	5067	K2 / V	20	wheel-marks on the neck	many black and white small grits	few big gray and white grits	5YR reddish yellow 7/6	1
8177/1	5042	K2 / V	21	wheel-marks on the neck	many black, gray, and white small grits	big white grits	10YR yellow 7/6	1-2
8200/2	5042	K2 / V	20	wheel-marks on the neck	many white and gray small grits	few big white grits	5YR reddish yellow 7/6	1-2
9591/1	4126	J1 / V	18	wheel-marks on the neck	many black, small grits	few white small and big grits	surface: 5YR reddish yellow 7/6; core: 10YR very pale brown 7/4	2-3

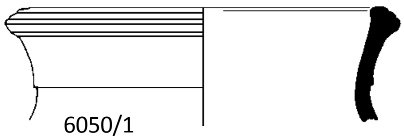
PT01A–C Collared pithoi (rim and rim-neck shards)

Reg. no	Locus	Area-phase/ Stratum	Rim	Rim width/ cm	remarks	main temper	second temper	color
10506/4	4282	U3A	3E	21	wheelmarks	basalt, much, small	chalk, little, coarse	out: 2.5YR 6/6; in: 7.5YR 7/4; core: 10YR 5/2
10533/5	4285	U3A	3F	16	wheelmarks, not illustrated	basalt, medium, medium	chalk, little, coarse	out: 7.5YR 8/4; in: 10YR 7/2; core: 10YR 5/1
10541/4	4285	U3A	3D	20	wheelmarks	basalt, much, small	chalk, little, medium	surfaces: 5YR 7/4; core: 10YR 5/3
10624/4	4312	U3B	3F	18	wheelmarks	basalt, much, small	chalk, little, coarse	out: 2.5YR 6/6; in: 5YR 6/4 core: 7.5YR 5/4
10897/3	4348	N3	3D	17	wheelmarks	basalt, much, small	chalk, little, coarse	out: 2.5YR 6/6; in: 5YR 6/6 core: 7.5YR 4/2
7263/6	4084	J1 / V		20	wheelmarks	many small black and white grits	many big white grits	surface: 7.5YR pink 7/4; core: 10YR grayish brown 5/2
12111/24	5439	W2	3	17	wheelmarks	basalt, much, medium	chalk, little, coarse	out: 10R 6/8; in: 2.5YR 6/6; core: 7.5YR 5/3
12159/6	5451	W2	3F	15	wheelmarks	basalt, much, small	chalk, little, coarse	out: 2.5YR 6/6; in: 2.5YR 6/4; core: 10YR 4/2
12071/4	5423	W2	3D	15	wheelmarks	basalt, much, small	chalk, little, coarse	out: 2.5YR 6/6; in: 7.5YR 6/2; core: 10YR 4/3
11573/2	6488	R		18	wheelmarks	basalt, much, small	chalk, little, medium	-
12037/2	5413	W2	5N	22	wheelmarks	basalt, little, coarse	chalk, medium, medium	out: 2.5YR 6/6; in: 5YR 7/6; core: 2.5YR 5/6

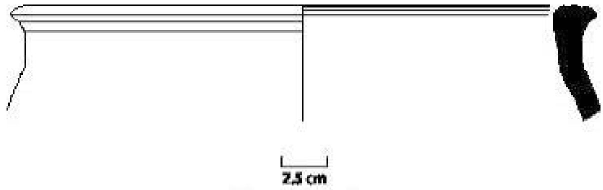
PT01A–C Collared Pithoi Shards



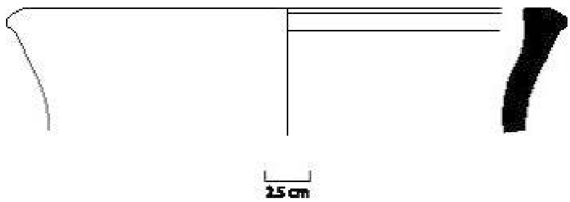
PT02 Everted, Wide Pithoi



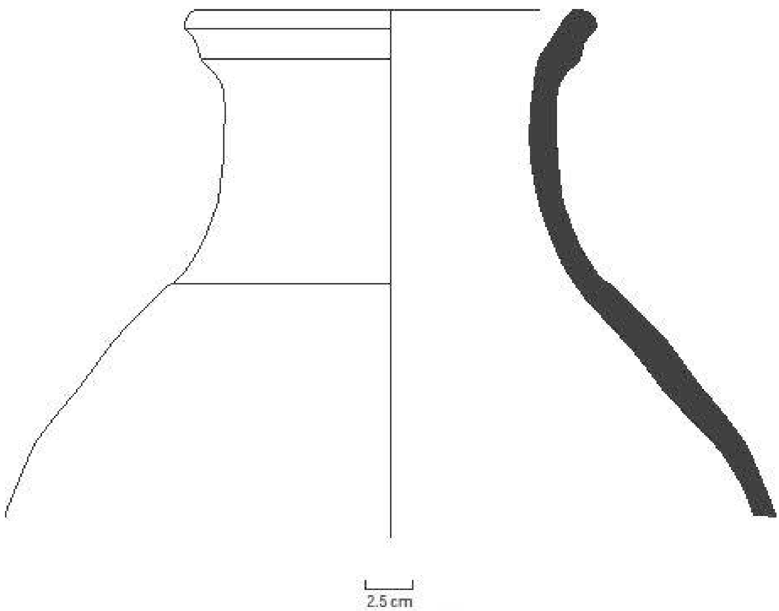
6050/1



L 9986-11024/1



L9969-11095/4



L4231-10307/1

PT02 Everted, Wide Pithoi									
Reg. no	Locus	Area-phase/ Stratum	Rim	Rim width cm	remarks	main temper	second temper	color	pres.
6050/1	3017	H2 / fill of VI		21		small white grits	white, gray, and orange grits	surface: 10YR white 8/2; core: 2.5Y light brownish gray 6/2	1
11024/1	9986	R		31		very many gray grits	organic, some	out: 10YR white 8/2; in: 10YR 7/3; core: 10YR 7/4	1
11095/4	9969	R / V		30	worn		many gray and white big grits	out: 2.5Y pale yellow 7/4; in: 10YR 6/3; core: 7.5YR 6/4	
10307/1	4231	U0	5K	20		basalt, much, medium	chalk, medium, small	surfaces & core: white N 8/0	1-2

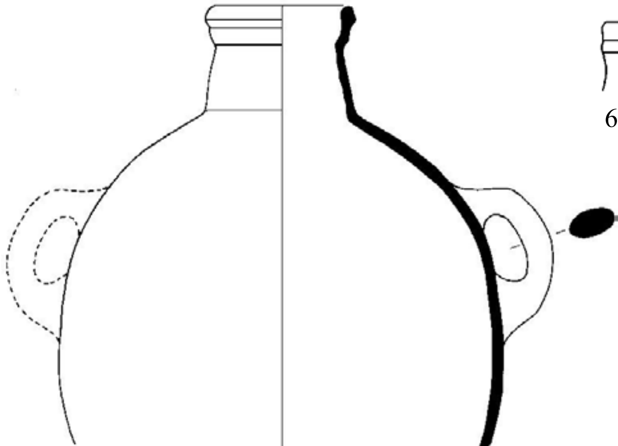
SJ01A Oval Jars with Ridged Neck

Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width /neck height cm	Max width/ height cm	remarks	main temper	second temper	color	preserv-ation
6466/1	3514	N2 / VI					many gray and white small grits	big white and few gray grits	surface & core: 10YR yellow 8/6	restored, 30 %
6483/1	3531	N2 / VI	3E				white and brown small grits	few very big white grits	surface: 5YR reddish yellow 7/6; core: 10YR gray 6/1	rim-neck
6480/2	3531	N2 / VI	3E				many small black, white, and gray grits	white, and few gray big grits	surface: 5YR reddish yellow 7/6 core: 10YR very pale brown 7/4	rim shard
6556/1	3571	N	3E				many black, few white small grits	big white, gray and brown grits	surface: 10YR yellow 8/6; core: 10YR yellow 7/6	rim shard
7250/1	4088	J2 / VI	3E	12.5 / 6.5	34 / 58		many white and gray small grits	many big white grits	10YR very pale brown 7/3	restored 95 %
7314/1	4088	J2 / VI	3E	11.1 / 8	33 / 48		many black and white small grits	few big white grits	5YR reddish yellow 7/6	restored 95 %
7314/2	4088	J2 / VI	3E	9.8 / 7			many black, gray, and white small grits	few big white grits	5YR reddish yellow 7/8	whole rim
5192/1	2079	G3 / VI	3E	11 / >4.5			many brown and white small grits	many big white grits	surface: 5YR reddish yellow 6/8; core: 7.5YR light brown 6/4	rim shard
5133/1	2050	G2 / V	3E	11.5 / 7	30 / -		many gray, few red and white small grits	many very big white grits, red	surface: 10YR yellow 8/6; core: 10YR very pale brown 7/4	restored 25%
7372/2	4149	J1 / V	3E	10 / -			many gray and white small grits	big white and gray grits	10YR very pale brown 7/3	rim shard
7426/1	4159	J1 / V	3E	11 / 7	33 / 48		many gray and white small grits	big white and few gray grits	10YR very pale brown 7/3	restored 90 %
6587/1	3578	N1 / V	3E				many black, and white small grits	big white grits	surface: 10YR very pale brown 8/4; core: 10YR very pale brown 7/4	restored 75 %
6707/1	3599	N1 / V	3E				white and gray small grits	many very big white grits	surface & core: 5YR reddish yellow 6/6	restored 85 %
7690/1	5277K	K2 / V	3E	11.5 / 6.5	25 / 53		many white, and black small grits	many very big white, few gray grits	surface: 5YR reddish yellow 7/6; core: 10YR very pale brown 7/4	restored 90%
7649/2	5269K	K2 / V	3E slight	9.5 / >7			many black and white small grits	big white grits	surface: 7.5YR reddish yellow 7/6; core: 10YR very pale brown 7/4	rim shard
7832/2	5309	K / V	3E	10.5 / >6			many black, and white small grits	big white and few gray grits	surface: 10YR yellow 7/6; core: 10YR very pale brown 7/4	rim shard
8130/1	5037	K2 / V	3E	10.5 / 6.5			many black small grits	few white and gray big grits	surface: 5YR reddish yellow 6/8; core: 10YR very pale brown 7/4	restored 50%
8218/1	5038	K / V	3E	11 / 7		traces of soot	gray, red and white small grits	many gray and white, red and black big grits	surface: 5YR reddish yellow 7/8; core: 7.5YR reddish yellow 6/6	rim-neck
8122/1	5042	K2 / V	3E	11.6/ 6.5			white small grits	white, and few gray big grits	surface: 5YR reddish yellow 7/6; core: 7.5YR reddish yellow 7/6	rim-neck
8174/1	5042	K2 / V	3E	10.3 / 7	30 / -		many black, white small grits	few big white grits	surface: 5YR reddish yellow 6/6; core: 7.5YR pink 7/4	larger fragment
8543/1	5068	K2 / V	3F	10.5 / 8			many small gray, brown and white grits	many big white grits	surface & core: 5YR reddish yellow 6/6	rim to shoulder
8543/2	5068	K2 / V	3E slight	10.5 / >7			many gray and white small grits	few big white grits	surface & core: 10YR very pale brown 7/4	rim shard
8487/1	5100	K2 / V	3E	11 / 7	36 / 52		many black and white small grits	few big, white grits	surface & core: 10YR very pale brown 7/3	restored 95 %
8500/1	5100	K2 / V	3E	9.6 / 7	32 / 49	traces of red slip	many black and white small grits	white and gray big grits	surface: 5YR reddish yellow 6/8; core: 10YR light yellowish brown 6/4	restored 90 %
8507/1	5100	K2 / V	3E	12 / 6			white, and few gray small grits	many big white, and few gray gr	surface: 7.5YR pink 7/4; core: 5YR reddish yellow 7/6	rim-neck
8510/2	5100	K2 / V	3E	10 / 8			many white and gray small grits	many big white grits	surface: 10YR very pale brown 8/3; core: 7.5YR pink 7/4	rim shard

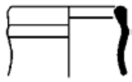
SJ01A Oval Jars with Ridged Neck (cont.)

Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width/ neck height cm	remarks	main temper	second temper	color	preser-vation
8546/1	5068	K2 / V	3E	10 / 7.5	traces of soot inside	very many gray and white, few brown small grits	few big white grits	surface & core: 10YR very pale brown 7/3	rim shards
10689/1	4301	U3B	3E	11 / -		basalt, much-medium, small-medium	chalk, little-medium, medium-coarse	surfaces: 10YR 7/2; core: 7.5YR 6/3	rim shard
10410/2	4269	U0 / U3	3E	9.2 / ca. 6		chalk, much, coarse	dark minerals, medium, medium	surfaces: 7.5YR 7/4; core: N 6/0	restored
10559/3	4285	U3A	3E	9 / ca. 7		basalt, medium, medium	chalk, little, coarse	out: 5YR 6/4; in: 2.5YR 7/6 core: 10YR 5/2	rim-neck
10522/1	4298	U3A	3E	11 / ca. 7		chalk, medium, coarse	basalt, medium, medium	surfaces: 7.5YR 8/3; core: 10YR 6/3	rim-neck
10586/4	4303	U3A	3E	8 / -		basalt, medium, small	quartz, little, coarse	out: 7.5YR 7/4; in: 2.5YR 6/4 core: 7.5YR 5/4	rim shard
10608/2	4303	U3A	3E	11 / -		basalt, much, small	chalk, little, small	out: 2.5Y 8/2; in: 10YR 8/2 core: 10YR 7/4	rim shard
12141/2	5447	W3	3E	9 / -		basalt, much, medium	chalk, medium, coarse	out: 10YR 8/4; in: 7.5YR 7/6; core: 10YR 5/3	rim shard
12111/14	5439	W2	3E	8 / -		chalk, medium, coarse	basalt, medium, medium	surfaces: 10Y 7/1; core: 10YR 6/2	rim shard
12127/5	5443	W2	3E	9 / -		basalt, medium, medium	chalk, medium, coarse	surfaces: 2.5YR 7/6; core: 7.5YR 6/2	rim shard
12120/13	5439	W2	3E	11 / -		basalt, much, small	chalk, medium, coarse	surfaces: 5YR 6/6; core: 10YR 5/2	rim shard
12089/4	5423	W2	3E	8.5 / -		basalt, much, small	chalk, little, coarse	surfaces: 7.5YR 7/4; core: 5YR 6/4	rim shard
12089/13	5423	W2	3E	10 / -		basalt, much, small	chalk, little, medium	surfaces: 5YR 7/4; core: 5YR 6/4	rim shard
12094/1	5423	W2	3E	10 / -		basalt, much, small	quartz, little, coarse	surfaces: 7.5YR 7/4; core: 10YR 6/3	restored
12055/2	5418	W2	3E	10 / -		basalt, much, small	chalk, little, medium	surfaces: 5YR 7/4; core: 5YR 6/4	rim shard
4119/1	1237	E2 / IV	3E thick	11 / 6		many gray and white small grits	gray, red, and few white big grits	surface: 7.5YR reddish yellow 7/8; core: 10YR light brownish gray 6/2	restored 90 %
4168/2	1249	E3-E2 / V-IV	3E						restored
4123/9	1237	E2 / IV	3E	11.5 / -		many black, white, and gray small grits	many big white grits	surface: 10YR very pale brown 7/3; core: 7.5YR dark gray N4	rim shard
4167/1	1254	E	3E						rim-neck
10259/2	4207	U2	3E	10 / -		chalk, medium, medium	basalt, medium, medium	out: 10YR 8/3 in & core: N 7/0	rim shard
10226/2	4219	U1	3E	10.5		basalt, much, medium	chalk, much, coarse	out: 5YR 6/6; in: 7.5YR 7/6; core: 7.5YR 6/4	restored
11554/2	6479	R2-2b		15		many medium black grits	few big white grits	-	1
11554/4	6479	R2-2b		9		many medium black grits	few big white grits	-	1
11562/3	6480	R2-2b		9		many small black grits	few big white grits	-	1
14429/1	1846	S			pale slip 10YR 8/2	some small black grits	very few big white grits	out: 10YR very pale brown 7/4; in: 2.5YR 5/2; core: 2.5Y 5/3	whole rim
14279/4	1779	S		10.5		many big white grits	some gray big grits	out & core: 10YR 7/4; core: 10YR 5/2	2
12760/1		S5				some black grits	very few big white grits	out: 5YR reddish yellow 7/6; in: 5YR 7/8; core: 7.5YR pinkish g 6/2	restored whole
12819/1		S5		40 cm wide	52 cm high	many small black grits	few big white grits	surface: 7.5YR pink 7/4	rest. 3

SJ01A Oval Jars with Ridged Neck

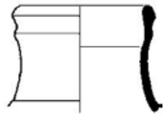


6466/1 (VI)

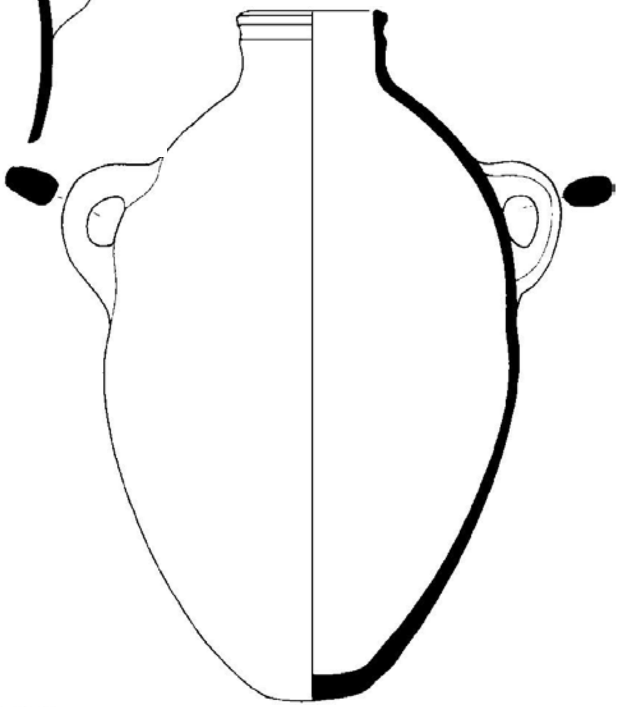


6480/2 VI

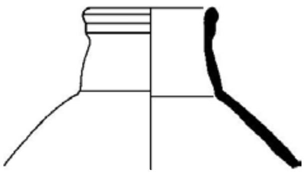
6483/1 VI



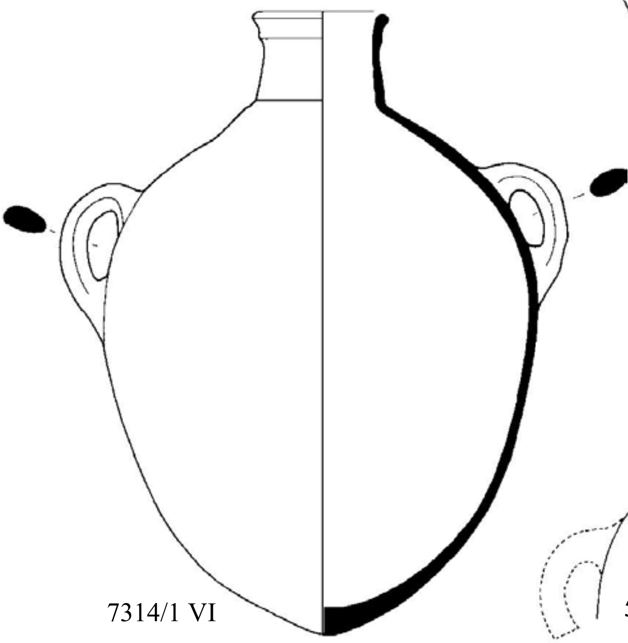
6556/1



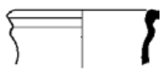
7250/1 VI



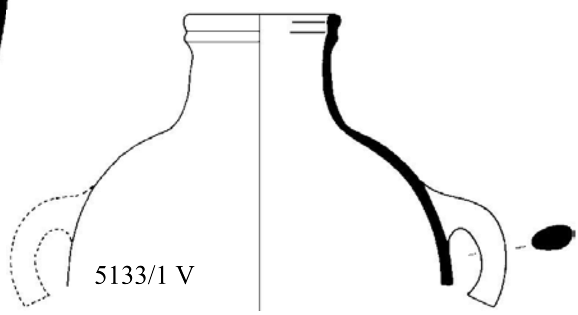
7314/2 VI



7314/1 VI

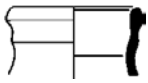


5192/1 (VI)

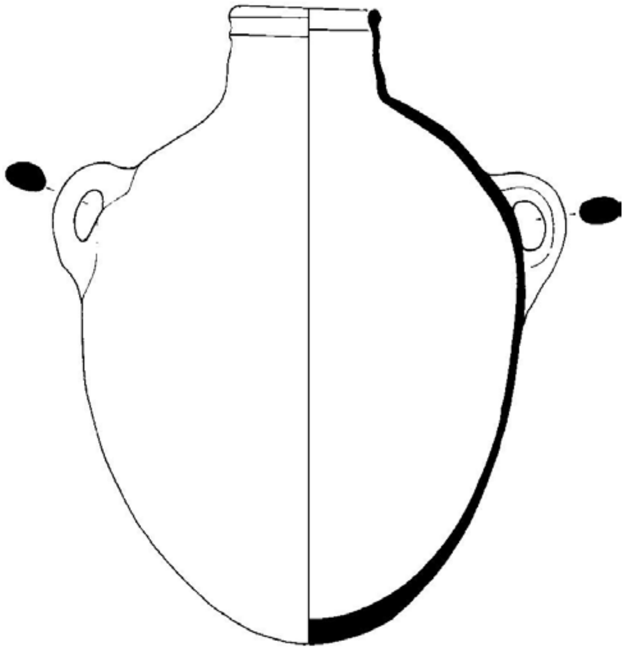


5133/1 V

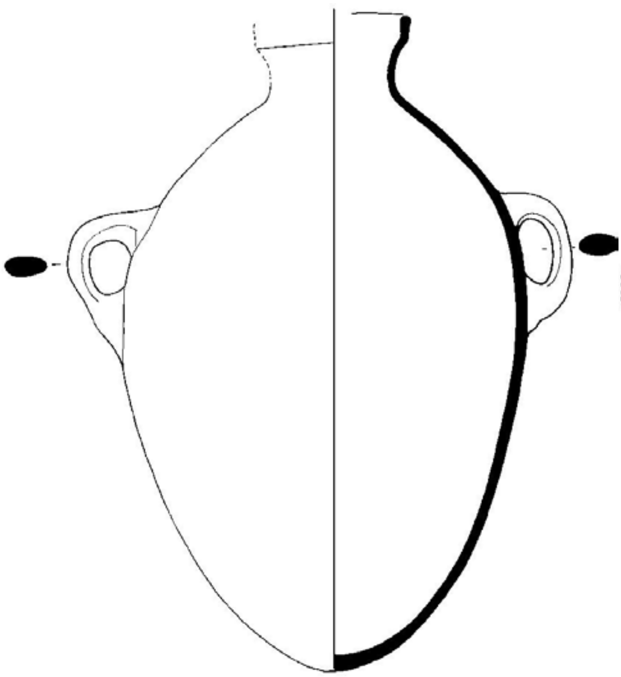
SJ01A Oval Jars with Ridged Neck



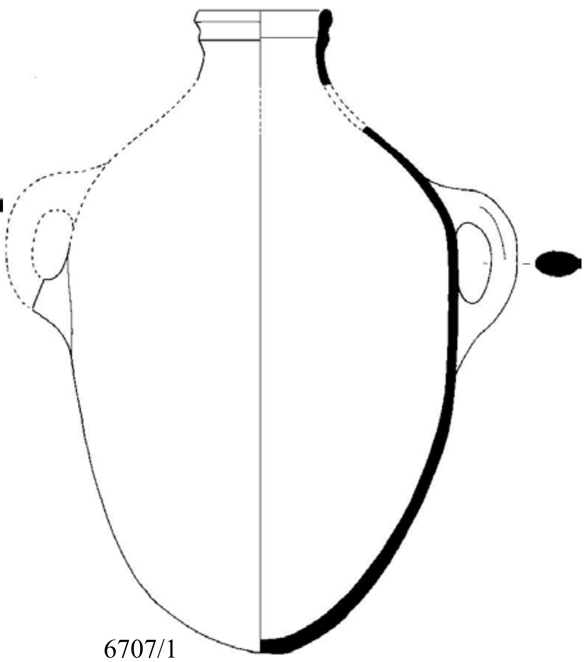
7372/2



7426/1 V

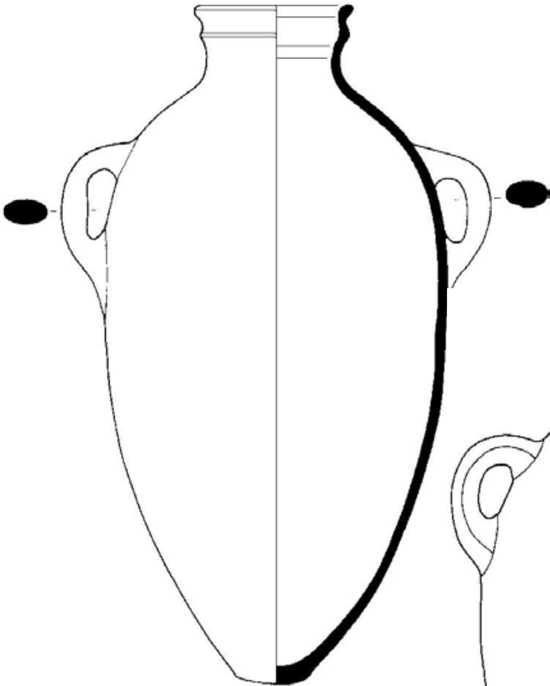


6587/1

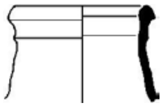


6707/1

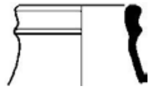
SJ01A Oval Jars with Ridged Neck



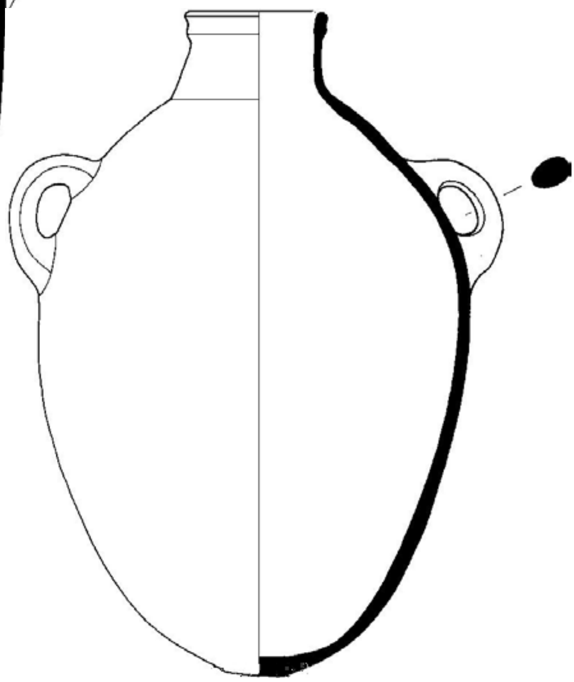
7690/1 V



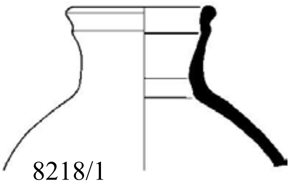
7649/2



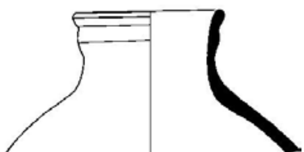
7832/2



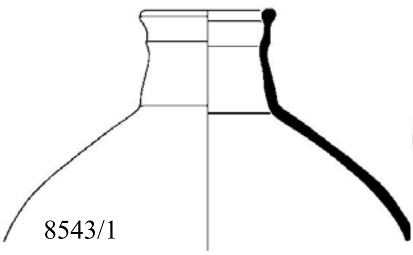
8130/1 V



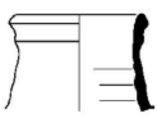
8218/1



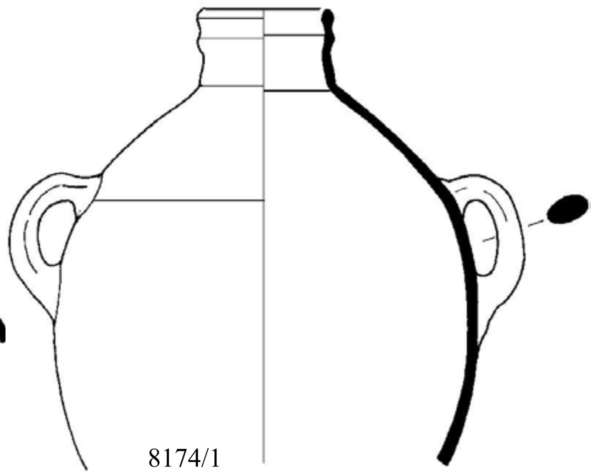
8122/1



8543/1

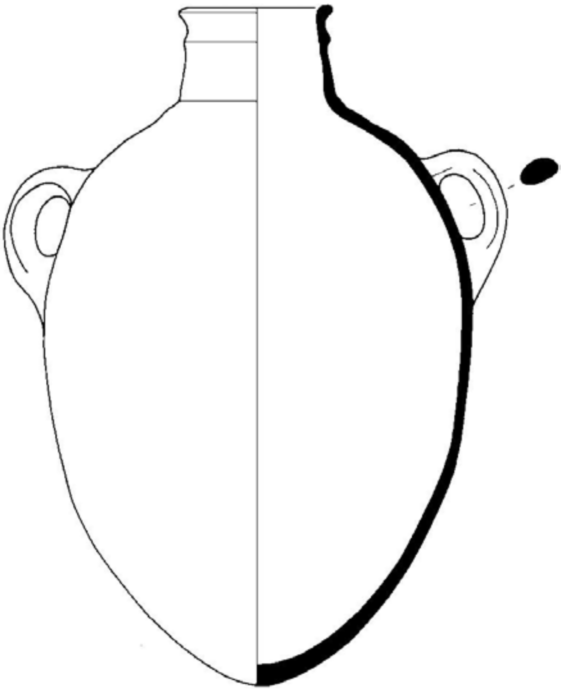


8543/2

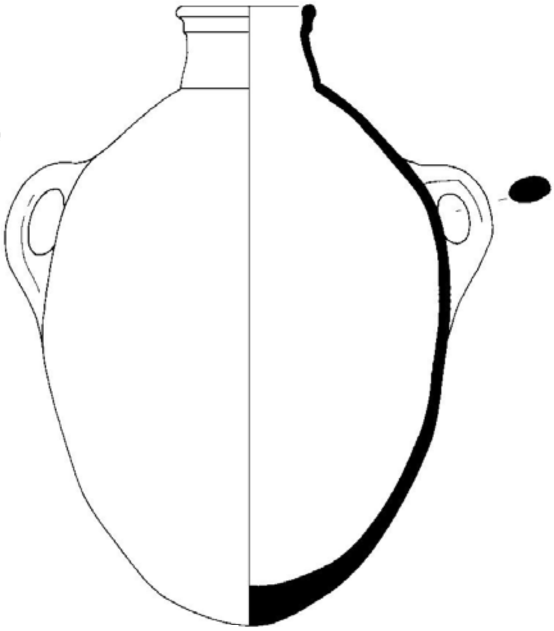


8174/1

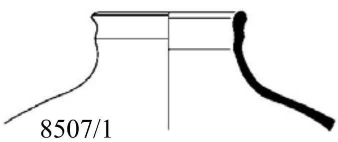
SJ01A Oval Jars with Ridged Neck



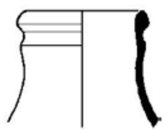
8487/1



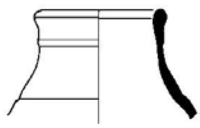
8500/1 V



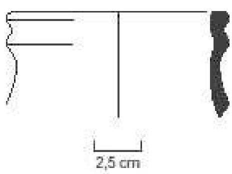
8507/1



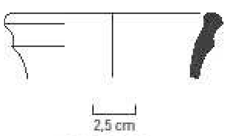
8510/2



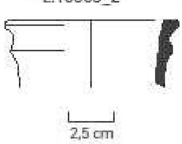
8546/1



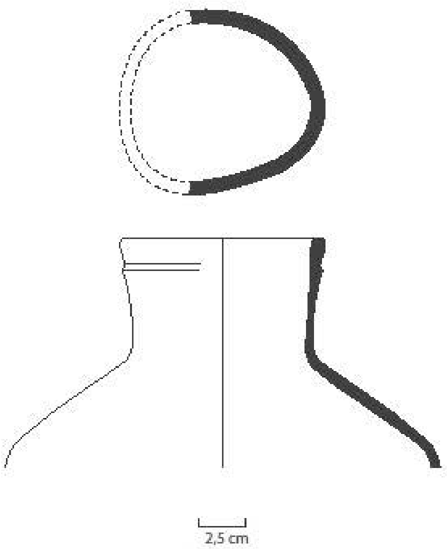
L.10689_1



L.10608_2

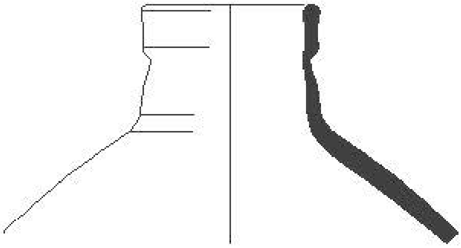


L.10586_4



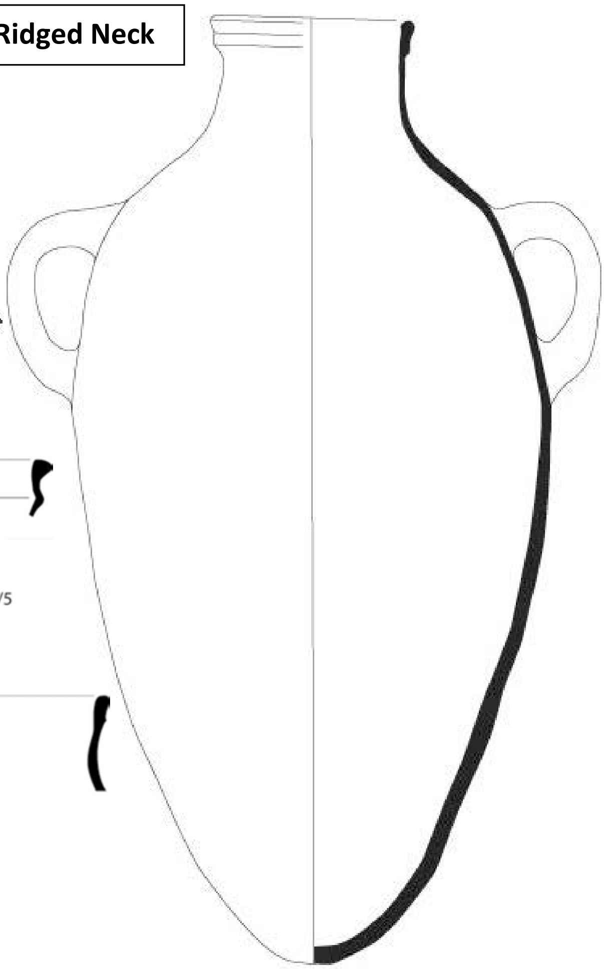
10522_1

SJ01A Oval Jars with Ridged Neck



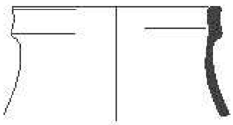
2,5 cm

10559_3



2.5 cm

L4269-10410

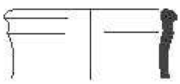


2,5 cm

L5447-12141-3

2.5 cm

L5443-12127/5

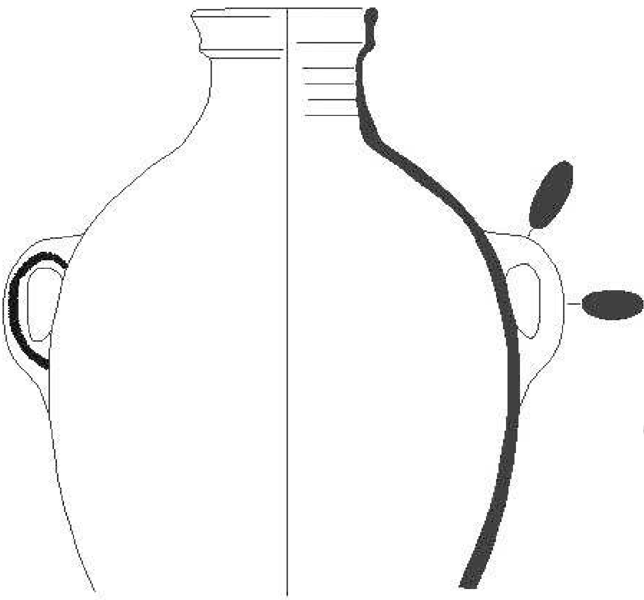


2,5 cm

L5439-12111-14

2.5 cm

L 5439-12120/13



2,5 cm

L5423-12094-1

2.5 cm

L 5423-12089-4

2.5 cm

L5423-12089/13

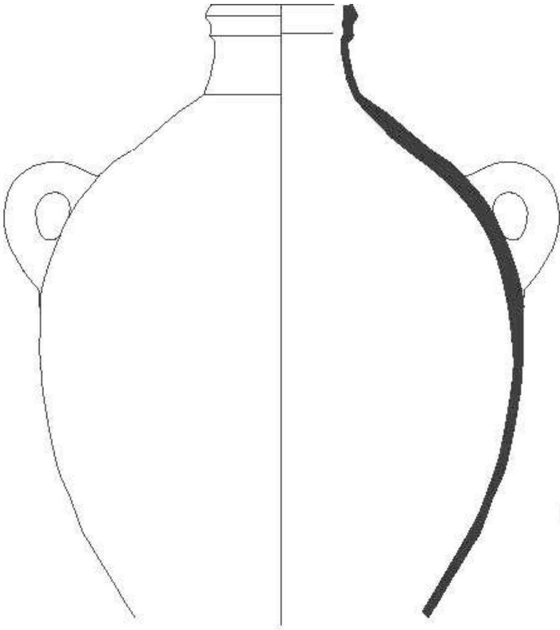
2.5 cm

L5423-12094/1

2.5 cm

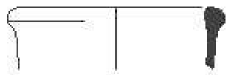
L5418-12055/2

SJ01A Oval Jars with Ridged Neck



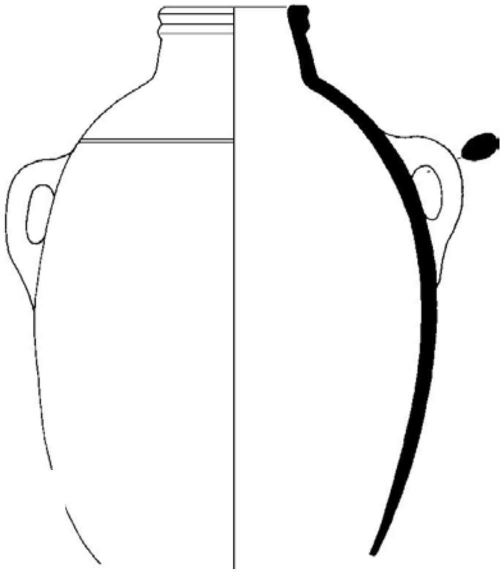
2.5 cm

L4219-10226/2

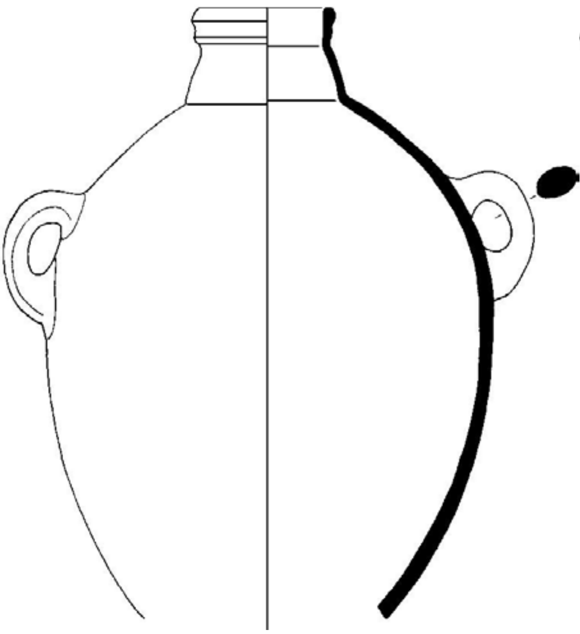


2,5 cm

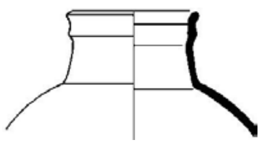
L4207-10259-2



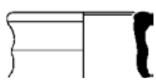
4168/2 (E3/E2: V/IV - L1249)



4119/1 (IV)

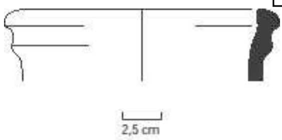


4167/1

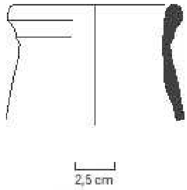


4123/9

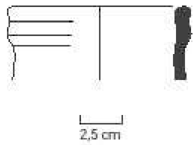
SJ01A Oval Jars with Ridged Neck



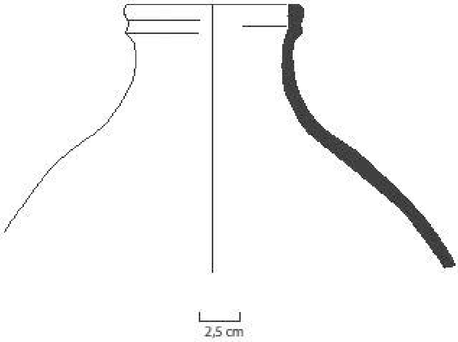
L6479-11554-2



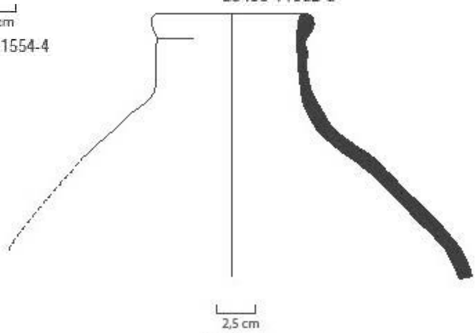
6479-11554-4



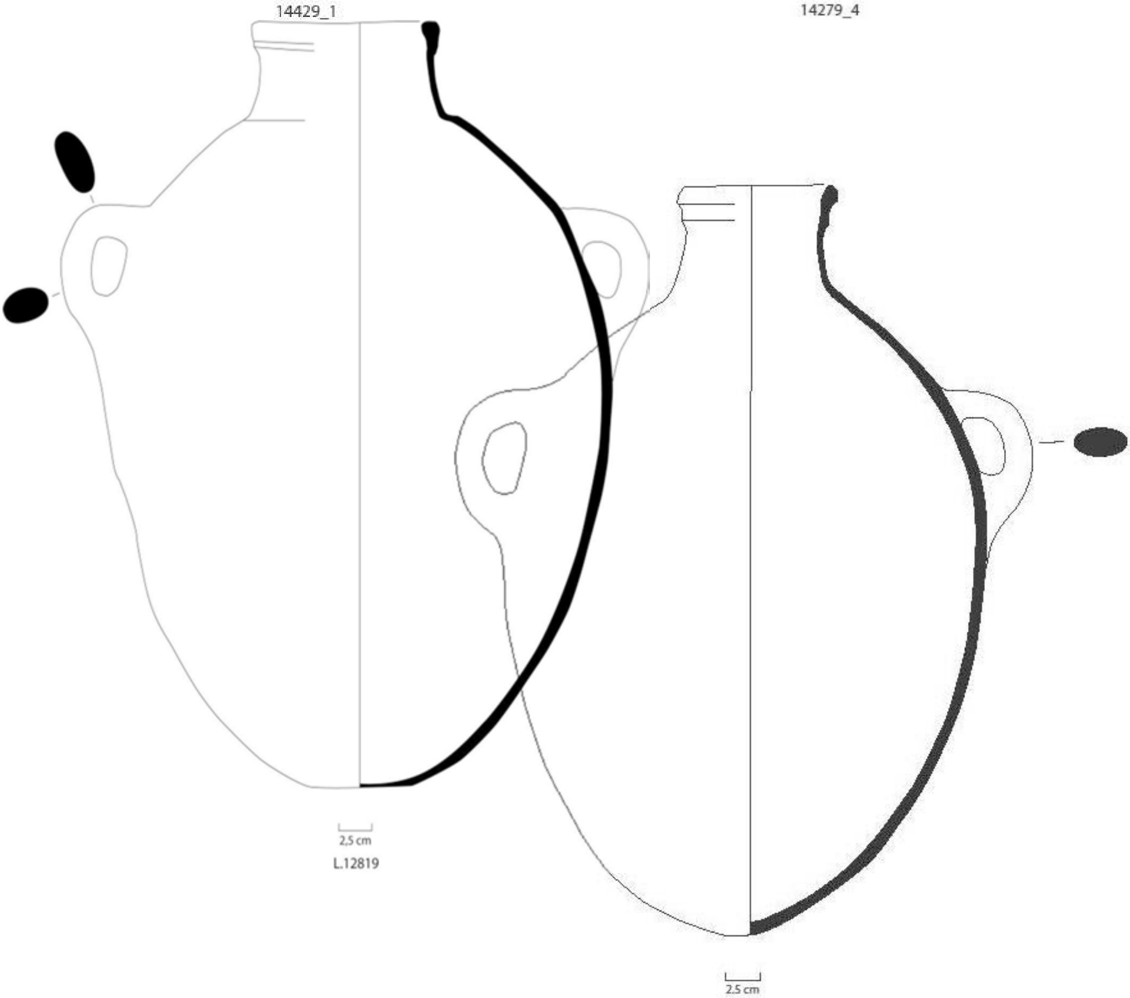
L6480-11562-3



14429_1



14279_4



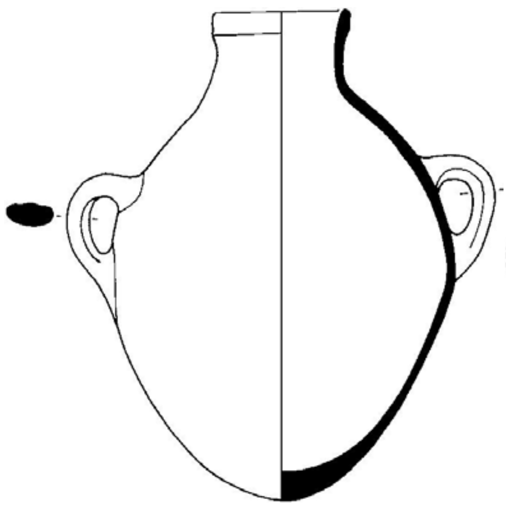
L.12819

L.1721
12760_1

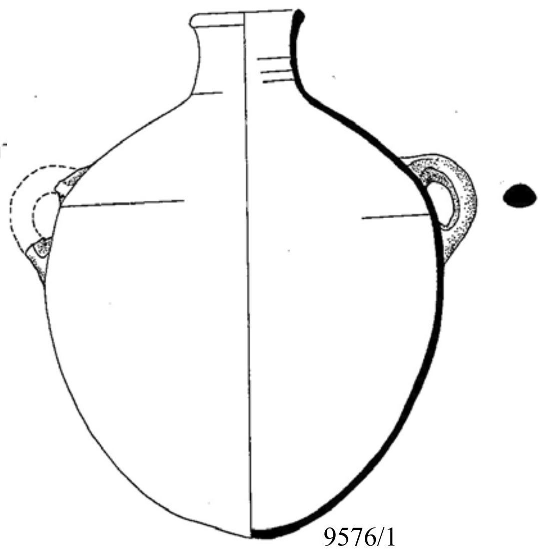
Appendix 5G Jars

SJ01B Oval Jars with Thickened Rim

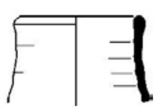
Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width/ neck height cm	Max width/ height cm	main temper	second temper	color	preser-vation
7374/1	4088	J2 / VI	3	10.5 / 6	27	many gray and white small grits	few gray and white big grits	7.5YR pink 7/4	restored 95 %
6527/1	3560	N / VI	1			very small quartz grits	-	surface: 5YR reddish yellow 6/6; core: 5YR dark reddish gray 4/2	rim-neck
9576/1	6143	R / V	1AB			many white and brown small grits	many white, few grayish brown big grits	surface: 5YR reddish yellow 7/6; core: 7.5YR pink 7/4	restored 85 %
5149/1	2057	G2 / V	11	10 / 7.5		many gray, few white small grits	big gray grits	surface & core: 10YR very pale brown 8/4	rim-neck
8777/1	5262	K2 / V	3E	11 / >8		black and white small grits	-	surface: 7.5YR pink 7/4; core: 2.5YR dark gray N4	rim shards
10654/3	4312	U3B	5BB	11 / -		basalt, much, small	quartz, little, medium	out: 7.5YR 8/3; in: 7.5YR 7/3 core: 7.5YR 5/3	rim shard
12097/2	5423	W2	3	11		basalt, much, small	chalk, little, medium	out: 10YR 8/4; in: 7.5YR 8/4 core: 5YR 7/4	rim shard
12139/6	5443	W2	6G3	9 / -		basalt, little, medium	chalk, little, coarse	out: 7.5YR 7/4; in: 5YR 6/4 core: 7.5YR 6/4	rim shard
10410/7	4269	U0 / U3	3	9 / -		chalk, much, coarse	red grits, little, coarse	out: 2.5Y 8/2; in: 5YR 6/6 core: 10YR 5/3	rim shard
13051/1	3815	D				some white grits	some traces of organic temper	out: 5YR 6/6; in: 10YR 6/4; core: 10YR 6/3	large fragm.
11553/1	6476	R		9	36 cm high	few black grits	few white grits	surfaces: 5YR reddish yellow 7/6	restored



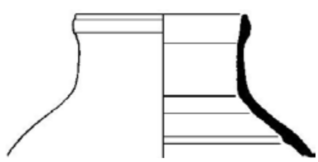
7374/1 VI



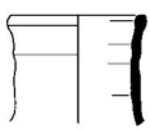
9576/1



6527/1 VI



5149/1 (G2 V)



8777/1

SJ01B Oval Jars with Thickened Rim

2,5 cm

L.10654_3

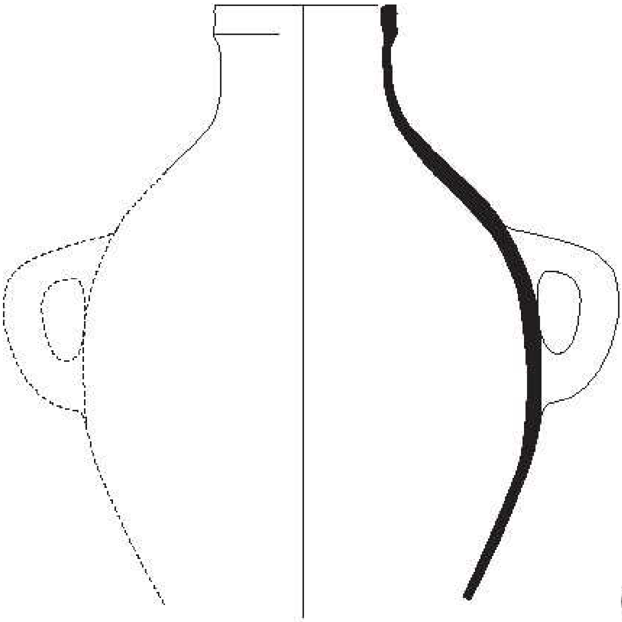
10410/7

2.5 cm

L5443-12139/6

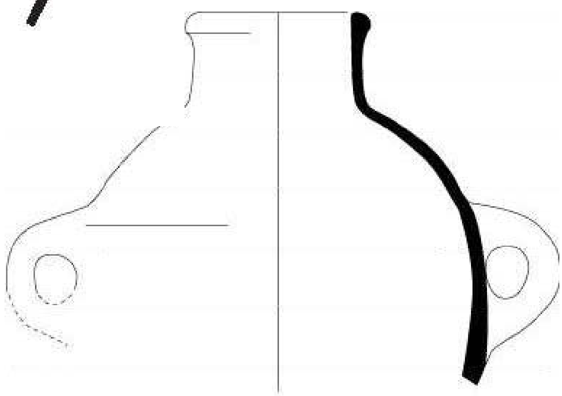
2.5 cm

L5423-12097/2



2,5 cm

L6476-11553-1

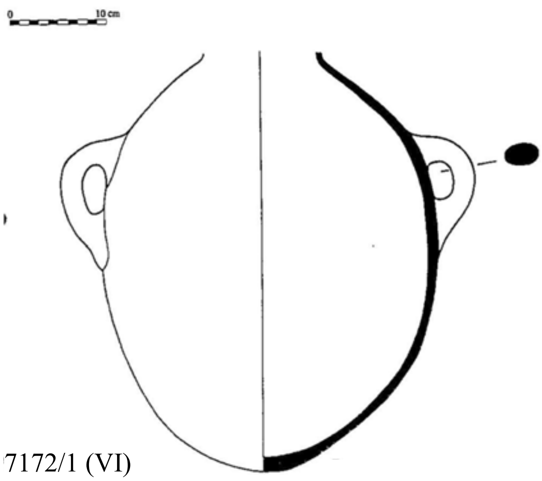


2,5 cm

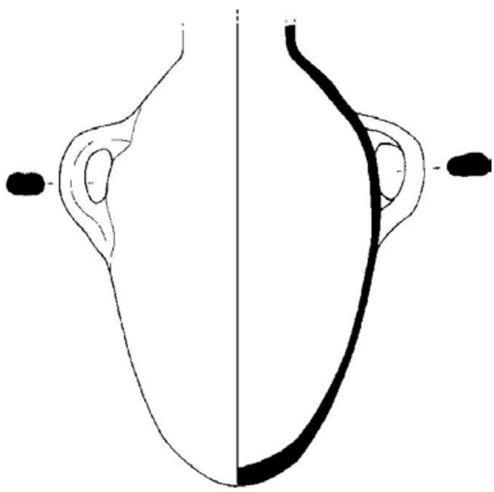
L3815-13051-1

SJ01A–B Oval Jars without Rim

Reg. no	Locus	Area-phase/ Stratum	Max width/ height cm	remarks	main temper	second temper	color	preser-vation
7172/1	4056	J2 / VI			many gray and white small grits	few very big white, gray, and red big grits	surface & core: 5YR reddish yellow 6/8	restored 80 %
7462/3	4095	J1 / V	25 / > 40		many gray and white small grits	many white, few gray big grits	surface & core: 7.5YR pink 7/4	restored 90 %
9249/1	6106	R / V			many white small grits	many very big white grits	surface & core: 7.5YR pink 8/4	restored 80 %
9563/1	6178	R / V			many black, few white small grits	few white and gray big grits	surface: 5YR reddish yellow 7/8; core: 10YR very pale brown 7/4	restored 85 %
9254/1	6106	R / V			very many black and white small grits	many black and white big grits	surface & core: 5YR reddish yellow 7/8	restored 80 %
9337/1	6116	R / V			many black small grits	few very big black grits	surface: 10YR very pale brown 8/3; core: 10YR very pale brown 7/3	restored 80 %
8871/1	5271	K0 surface			many gray and white small grits	many very big white, gray and brown grits	surface: 7.5YR reddish yellow 7/8; core: 7.5YR reddish yellow 7/6	restored
8871/2	5271	K0 surface			black and few white small grits	few white and gray big grits	surface: 7.5YR reddish yellow 7/6; core: gray	base
10568/3	4301	U3B			quartz, much, small	dark minerals, medium, coarse	out: 5YR 7/6; in: 7.5YR 7/6; core: 10YR 6/3	restored
12094/2	5423	W2			basalt, much, small	quartz, very little, small	out: 7.5YR 7/4; in: 5YR 6/6; core: 10YR 7/3	large fragment
10623/3	4301	U3B	31.5/51		some black and quartz grits	some big white grits	out: 7.5YR pink 7/4; in: 2.5YR light red 6/6; core: 7.5YR brown 5/2	restored
12816/3	1721	S	36 / 50		many small black, few quartz grits	very few, big white grits	out: 7.5YR reddish yellow 6/6; in: 10YR grayish brown 5/2; core: 10YR very pale brown 7/3	restored
14454/1	1858	S	34.5 / 48	smoothed neck	many small black grits	some white grits	out: 2.5YR light red 6/6; in: 2.5YR red 5/8; core: 5YR dark gray 4/1	restored
12082/2	5423	W2			basalt, much, small	chalk, medium, coarse	out: 10YR 8/3; in: 10YR 7/3; core: 10YR 6/3	large fragment

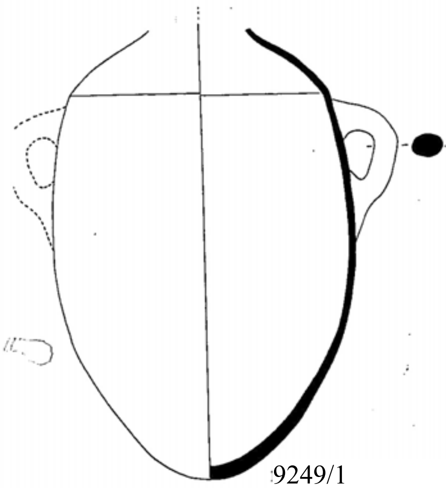


7172/1 (VI)

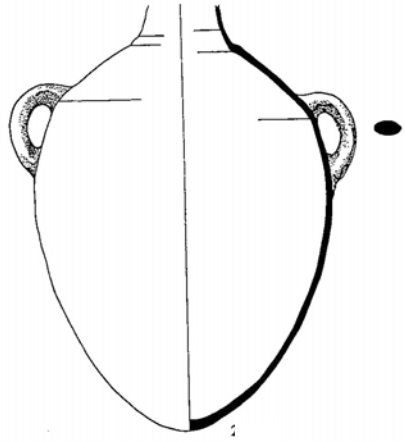


7462/3 V

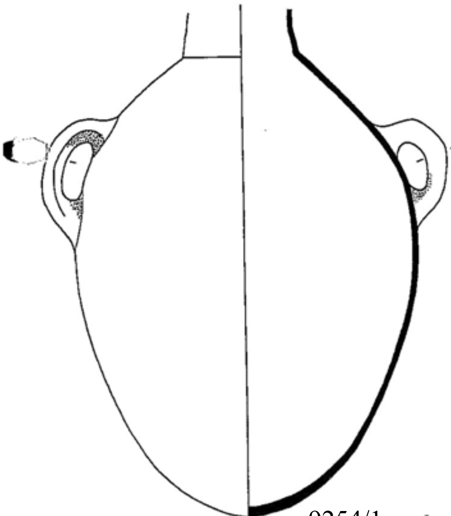
SJ01A–B Oval Jars without Rim



9249/1

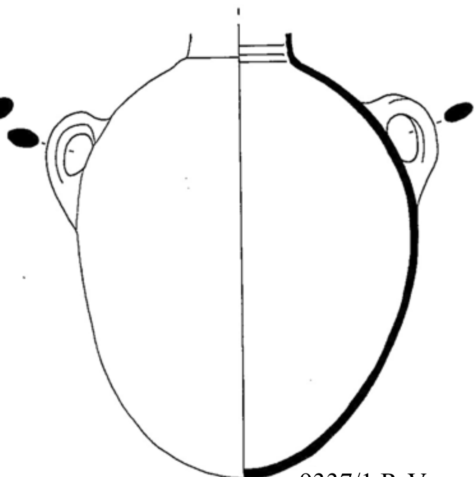


9563/1 R-V

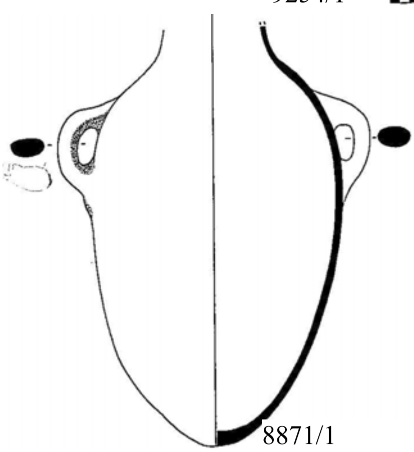


9254/1

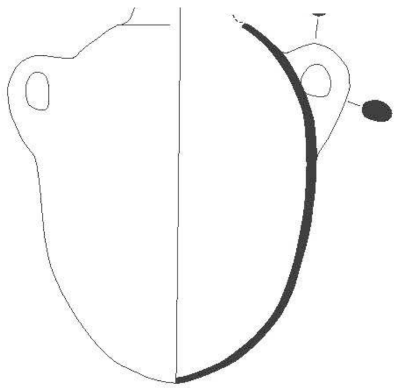
0 10 cm



9337/1 R-V



8871/1

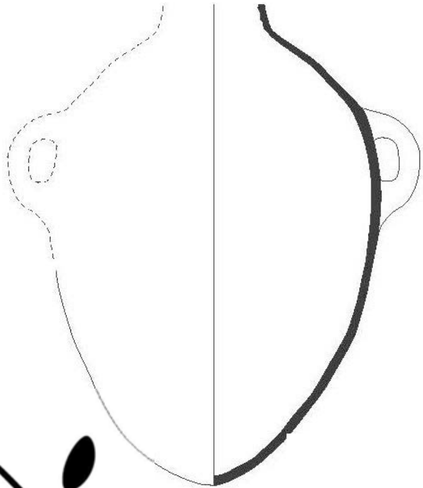


2,5 cm

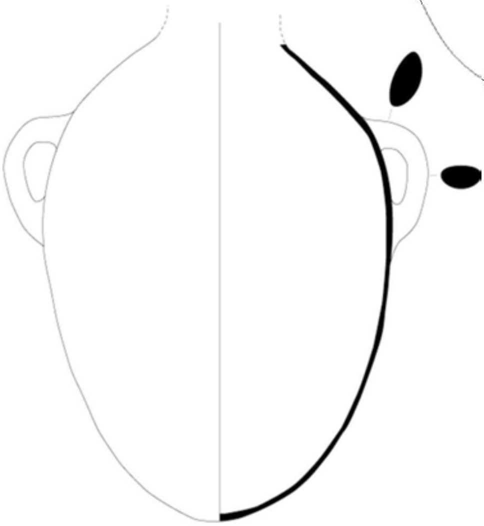
10658_3

Appendix 5G Jars

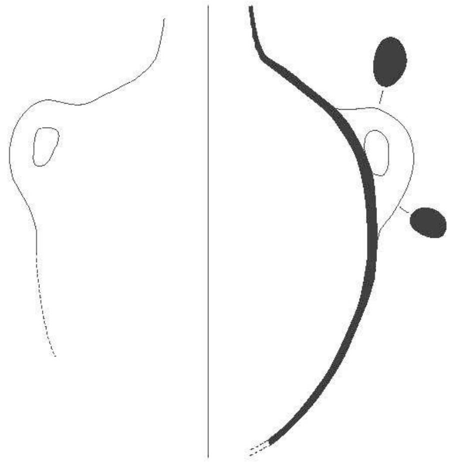
SJ01A–B Oval Jars without Rim



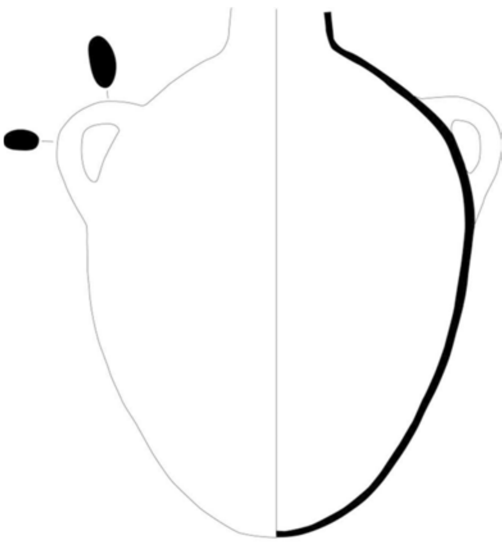
2,5 cm
L.5423
12094_2



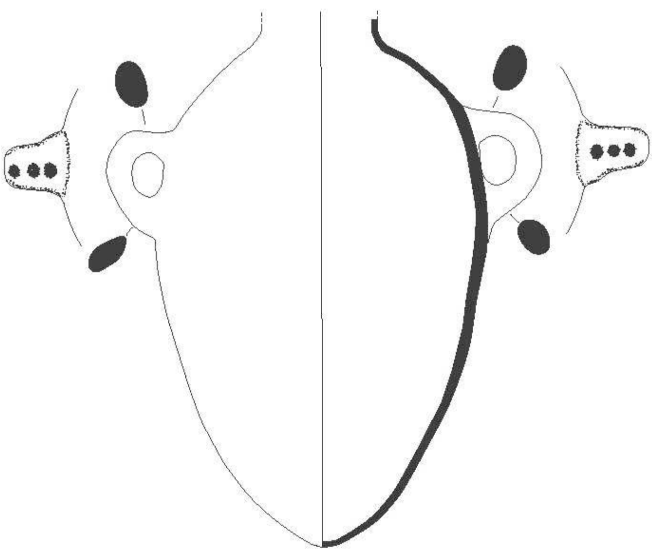
2,5 cm
L5423-12082-2



2,5 cm
14454_1



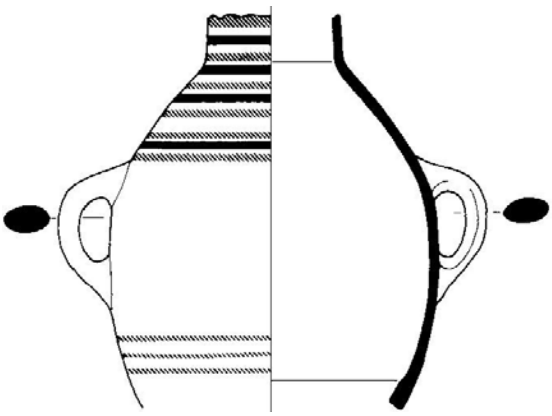
2,5 cm
L.12816_3



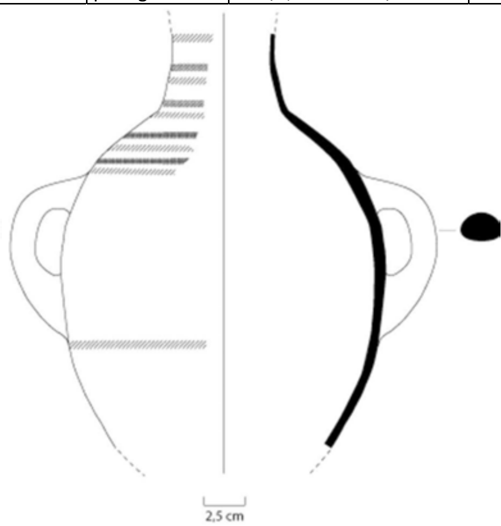
2,5 cm
10623_3

SJ01C Oval Jars with Painted Bands

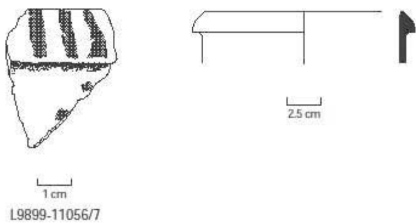
Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width cm	Max width cm	remarks	main temper	second temper	color	preser-vation
7836/3	5309	K / V	-	-		weak red (10R 4/4) and dark gray (5YR 4/1) stripes	many black and white small grits	big white grits	surface: 5YR reddish yellow 7/6; core: 10YR very pale brown 7/4	restored 30 %
12177/5	5461	W3	-	-		reddish brown (2.5YR 4/3) and dark gray (5YR 4/2) stripes	basalt, much, small	chalk, little, coarse	out: 7.5YR 7/4; in: 7.5YR 7/6; core: 10YR	large fragm.
11056/7	9899	R		10		gray 5YR 5/1 and brown 5YR 4/3 stripes on the rim	chalk, much, small	organic, medium, medium	out: 5YR pink 7/4; in: 5Y 2.5/2 black; core: 5YR gray 5/1	rim shard
11068/1	9926	R		10		gray 5YR 4/1 and red 2.5YR 4/6 stripes on the rim	few small gray grits	few, traces of organic temper	surfaces: 5YR reddish yellow 7/6; core: 2.5Y N4	rim shard
12055/4	5418	W2	3C	12		dark brown (7.5YR 3/2) paint on rim	basalt, much, small	chalk, little, coarse	out: 10YR 8/4; in: 5YR 7/4 core: 10YR 6/3	rim shard
12805/3	1718	S			ca. 20	gray 10YR 4/1 and red 2.5YR 4/4 stripes	many small black grits	few white and quartz grits	out: 7.5YR light brown 6/4; in: 5YR 6/4; core: 10YR 5/2	body shard



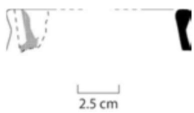
7836/3 V



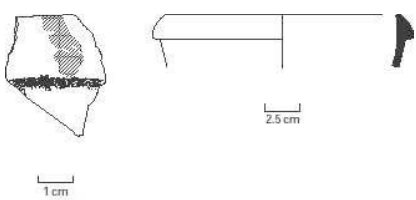
L5461-12177-5



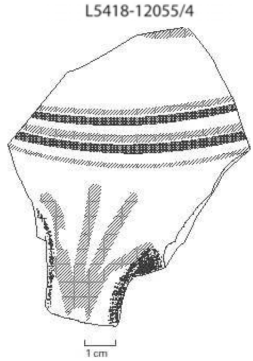
L9899-11056/7



L5418-12055/4



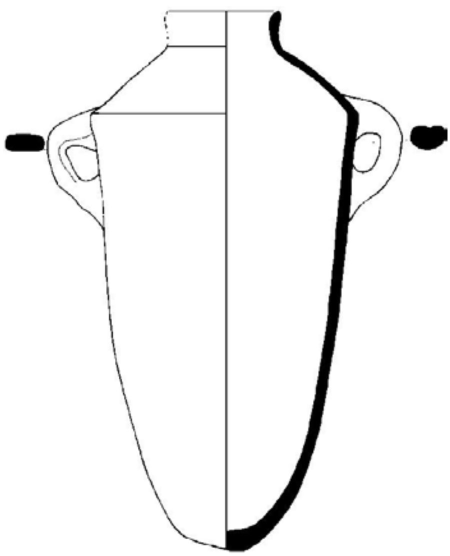
L9926-11068/1



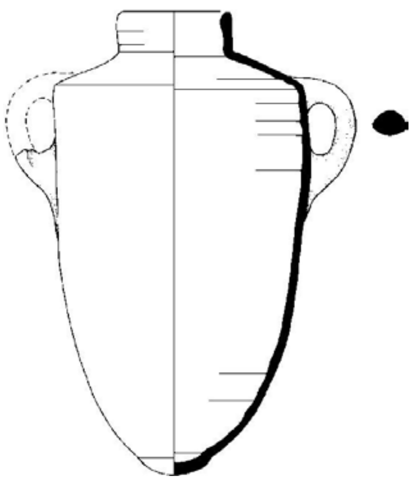
L.1718
12805_3

SJ02 Carinated Jars

Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width/ neck height cm	Max width/ height cm	remarks	main temper	second temper	color	preser-vation
6708/1	3599	N1 / V					very many white small grits	few white and gray big grits	surface: 5YR reddish yellow 7/8; core: 10YR very pale brown 7/4	restored 85 %
6763/1	3656	N1 / V					black, red, and white small grits	few white big grits	surface: 7.5YR reddish yellow 7/8; core: 7.5YR reddish yellow 7/6	restored 85 %
7454/1	4159	J1 / V	1	11.5 / 4	28 />40		white and gray small grits	very few very big white grits	surface: 5YR reddish yellow 6/8; core: 10YR gray 5/1	restored 80 %
9649/1	4046	J1 / V	1	10 / 3.3	24 / 45		many reddish brown small grits	few white big grits	2.5YR light red 6/8	whole vessel
9266/1	6106	R / V					many black, few gray small grits	very few white and gray big grits	surface: 2.5YR light red 6/8; core: 7.5YR reddish yellow 7/6	restored 95 %
7849/1	5309	K / V	1	10 / 3	>26 / -		many black, few white small grits	big white grits	surface: 5YR reddish yellow 6/8; core: 10YR gray 5/1	large fragment
8429/1	5065	K2 / V	1	11 / 3	25 / 52		many white small grits	many white big grits	surface: 10YR very pale brown 8/3; core: 10YR gray 6/1	restored 85 %
8216/1	5027	K2 / V								base
10568/2	4301	U3B	3	8.5 /			quartz, much, small	dark minerals, medium, coarse	out: 5YR 7/6; in: 7.5YR 7/6; core: 10YR 6/3	restored
10558/1	4285	U3B	1	9.5 /		pale slip out 10YR 8/4	basalt, medium, medium	chalk, medium, medium	out: 7.5YR 6/4; in: 10YR 6/3; core: 10YR 5/1	restored
10491/3	4276	U3B	1	9 /		simple rim?	quartz, little, medium	red grits, little, small	out: 5YR 6/6; in: 7.5YR 7/4; core: 7.5YR 5/2	restored
10588/7	4301	U3B	1	11 /			basalt, medium, small	quartz, little, small	surfaces: 7.5YR 7/4; core: 5YR 6/6	rim shard
12049/3	5418	W2	3	13			red grits, little, medium	quartz, little, small	out: 7.5YR 6/4; in: 5YR 6/4; core: 2.5Y 4/1	rim shard
12083/4	5423	W2	-	-	22 / ca. 40	very thick walls	basalt, much, small	chalk, medium, coarse	out: 5YR 7/6; in: 10YR 6/3; core: 10YR 5/1	large fragment
14053/1	6684	R		10	25/35.5		few big white grits	very few small black grits	out: 5YR reddish yellow 6/6; in: 10YR yellow 7/6; core: 5YR pink 7/3	large fragment
4074/1	1225	E2 / IV	3	11.7 /3.5	30 / -		many black, gray, white and quartz small grits	brown, few white big grits	surface: 2.5YR red 5/8; core: 10YR very dark gray 3/1	large fragment

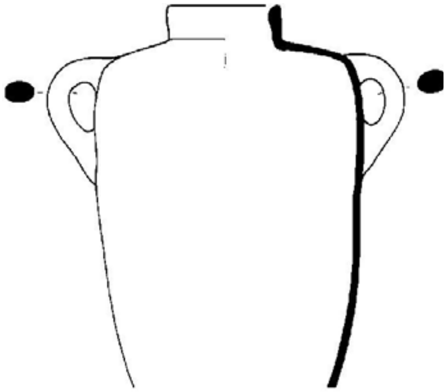


6708/1

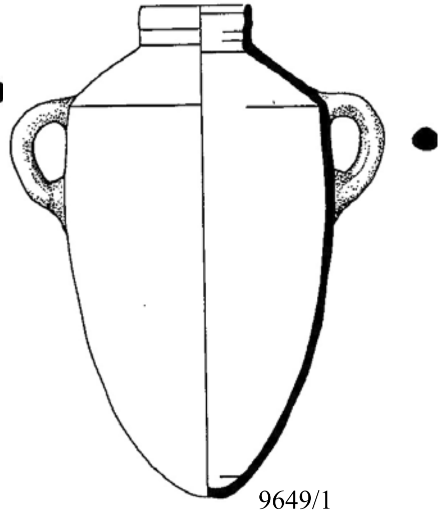


6763/1

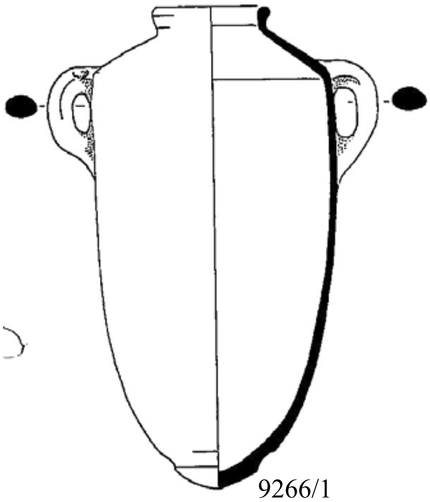
SJ02A Carinated Jars



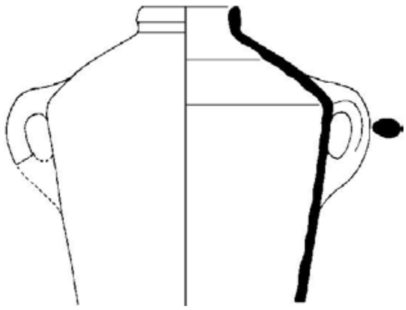
7454/1



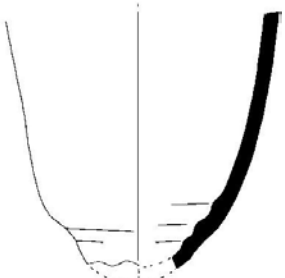
9649/1



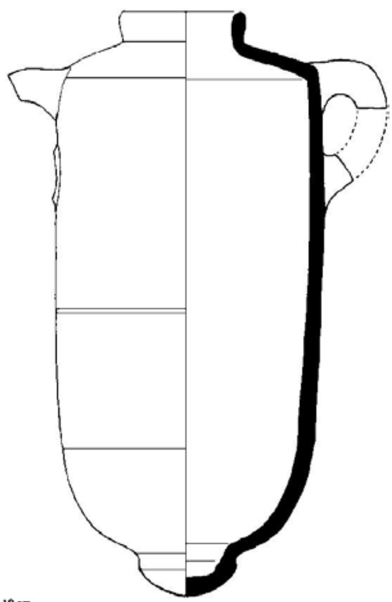
9266/1



7849/1



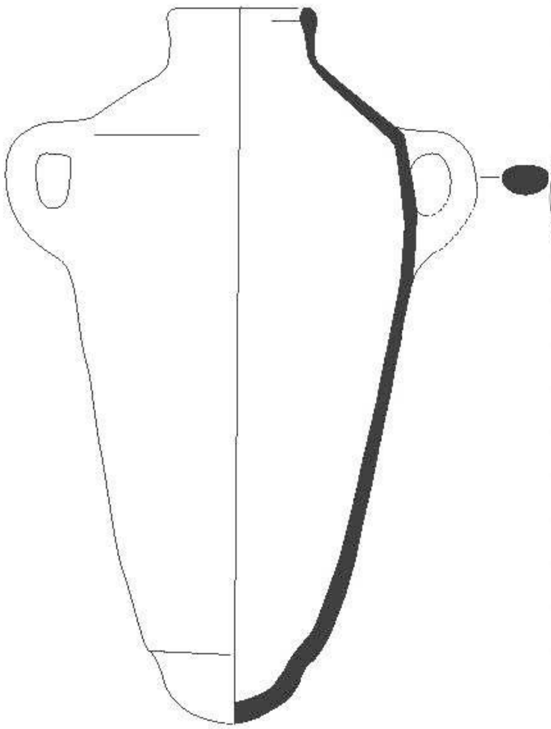
8216/1



8429/1

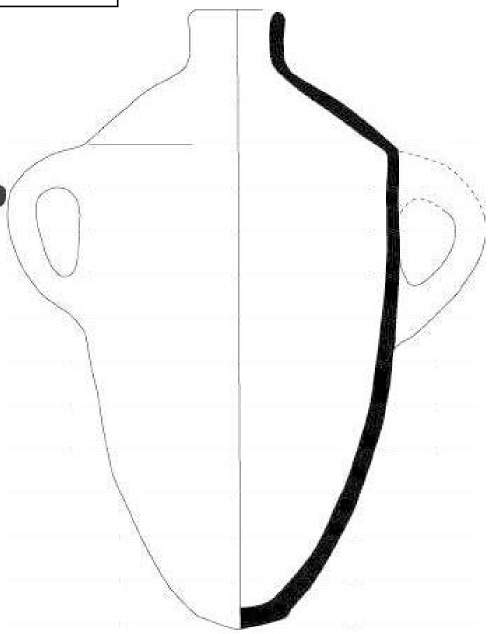
Appendix 5G Jars

SJ02A Carinated Jars



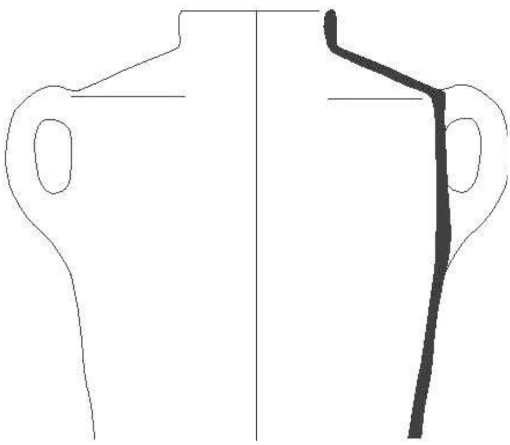
2,5 cm

10658_2



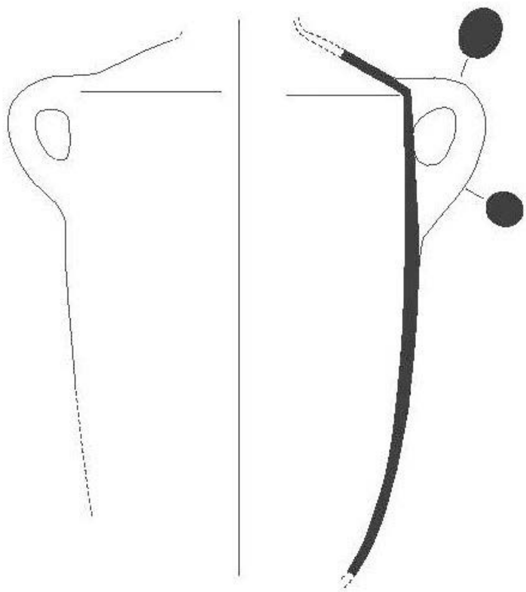
2,5 cm

L4285-10558-1



2,5 cm

L.6684
14053_1



2,5 cm

10491_3

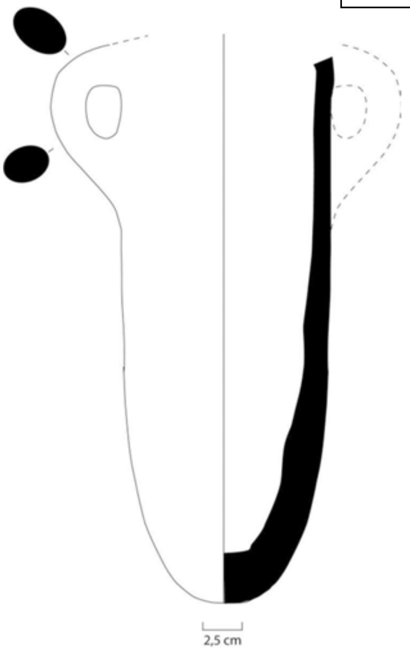
2,5 cm

L.10588_7

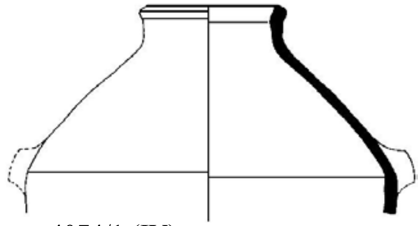
2,5 cm

L5418-12049-3

SJ02A Carinated Jars

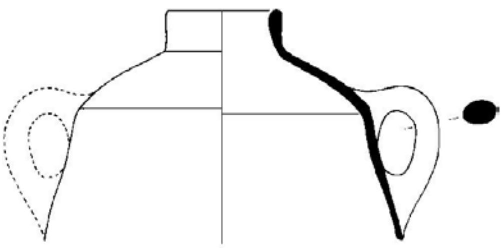


L.12083_4

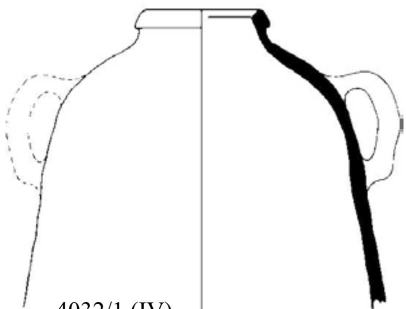


4074/1 (IV)

SJ02B Carinated Jars with Bag Shaped Body



8175/1 (V)



4032/1 (IV)

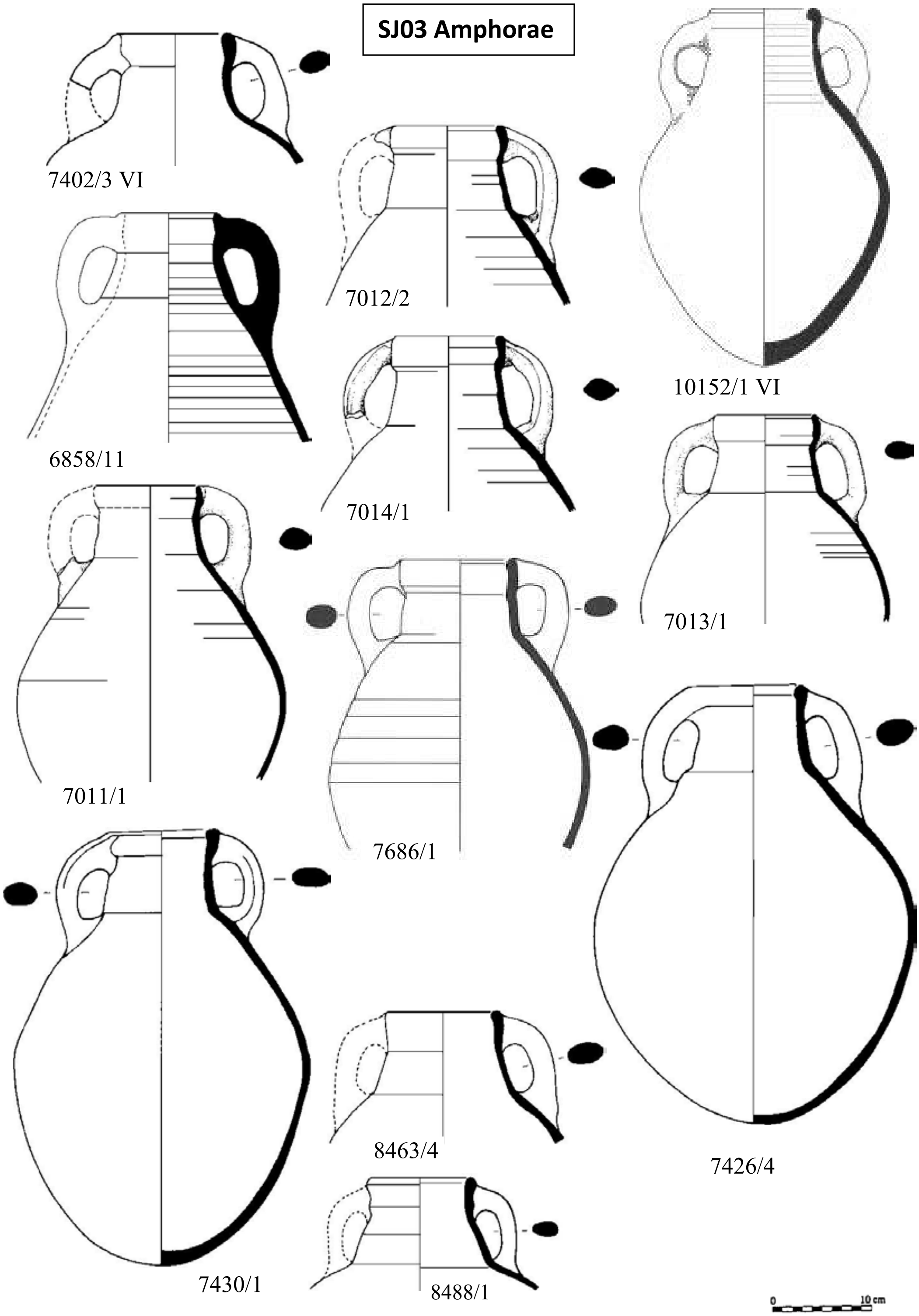
SJ02B Carinated Jars with Bag Shaped Body										
8175/1	5042	K2 / V					.	few big gray and white grits	surface: 7.5YR reddish yellow 6/6; core: 10YR gray 5/1	large fragment
4032/1	1205	E1 / IV	5B	10 / 3			white and gray small grits	very big white, big gray grits	surface: 7.5YR pink 7/4; core: 2.5YR gray N6	large fragment

Appendix 5G Jars

SJ03 Amphorae

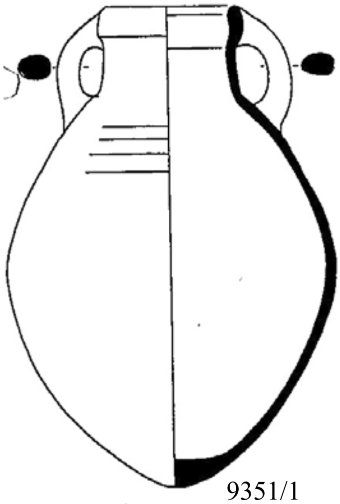
Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width/ neck height cm	width/ height cm	remarks	main temper	second temper	color	preser-vation
7402/3	4088	J2 / VI	5AB	10.4 / 8			basalt, much, medium	chalk, little, medium	5YR reddish yellow 7/6	rim to shoulder
10152/1	9020	T3 / VI		10 / -	- / 40		few gray grits	some big white grits	surfaces & core: yellowish red 5YR 5/6	whole
6858/1	3670	N1 / V					many gray small grits	few white and gray big grits	surface: 5YR reddish yellow 7/8; core: 10YR grayish brown 5/2	rim to body
7011/1	3725	S / V	2	10.5 / 6.5	26		basalt, much, small	chalk, medium, medium	surface: 5YR reddish yellow 7/8; core: surface: 7.5YR reddish yellow 6/6	rim to body
7012/2	3725	S / V	2	10.4 / 7.5			basalt, much, small	chalk, little, medium, organic temper	surface: 10YR very pale brown 7/4; core: 10YR pale brown 6/3	rim to shoulder
7013/1	3725	S / V	2	9.5 / 6.8	24	traces of fire	basalt, much, small	chalk, medium, medium	surface: 5YR reddish yellow 7/8; core: 7.5YR reddish yellow 6/6	rim to body
7014/1	3725	S / V	2	10.8 / 7.5			basalt, much, small	chalk, little, medium	surface: 5YR reddish yellow 6/6; core: 10YR grayish brown 5/2	rim to shoulder
7426/4	4159	J1 / V	2	9.2 / 7	28.5 / 42		basalt, much, small	chalk, little, medium	7.5YR pink 7/4	restored 95 %
7430/1	4126	J1 / V	2B	10.7 / 7.7	28 / 42		basalt, much, small	chalk, little, medium	7.5YR reddish yellow 7/6	restored 95 %
7686/1	5269K	K / V?					-	-	-	
8463/4	5088	K2 / V	3	10 / 7.5			many white and gray small grits	few white, big grits	surface: 7.5YR reddish yellow 7/6; core: 7.5YR pinkish gray 7/2	rim to shoulder
8488/1	5100	K2 / V	3E	10 / 8			white and gray small grits	few very big white and big gray grits	surface & core: 7.5YR reddish yellow 7/6	rim to shoulder
9351/1	6132	R / V	2	10.3 / 7.5	28 /42		basalt, much, small	chalk, little, medium	surface: 7.5YR reddish yellow 7/6; core: 7.5YR reddish yellow 6/6	restored 95 %
9272/2	6105	R / V	2				black and white small grits	-	surface: 7.5YR reddish yellow 7/6; core: 10YR very dark gray 3/1	restored
9289/1	6116	R / V	2	10.3 / 8	28 / 43		basalt, much, small	chalk, little, medium	surface & core: 7.5YR reddish yellow 7/8	restored 85 %
9270/1	6106	R / V	2	9.9 / 7.5	26 / 41.5		basalt, much, small	chalk, medium, medium; organic	surface: 10YR very pale brown 8/4; core: 10YR very pale brown 7/4	restored 85 %
9326/1	6132	R / V	-	-	-	or a jug	many black and white small grits	few white big grits	surface: 2.5YR light red 6/6; core: 10YR very pale brown 7/4	restored 85 %
11573/1	6488	R		8 / -			some small black grits	some big white grits	-	1
11075/12	9904	R		9.2	21 / 31		some black grits	few white grits	out: 7.5YR light brown 6/4; in: 7.5YR black N2.5 ; core: 2.5Y N4 dark gray	restored 2-3
11327/1	6431	R		8	21 / 26		some small black grits	few big white grits	surface: 5YR reddish yellow 6/6	restored whole
11317/2	6431	R		7			many small black grits	many white grits	surface: 2.5YR light reddish brown 6/4	rim-shoulder
10128/1	9012	T2		10	26.5/40		many small black grits	some big white grits	out: 2.5YR red 5/6; in: 7.5YR pink 7/4	restored whole
12828/1	1721	S		9.5	29 / 39		small black grits	few quartz grits	surface: 7.5YR pink 7/4	R whole
12825/1	1721	S			26 / 32		small black grits	few big white grits	out & core: 10YR 6/4; in: 5YR 6/6	R 2-3
14048/4	6673	R			16 / -		few black grits	few white grits	out: 7.5YR 6/6; in: 5YR 6/6; core: 7.5YR 6/4	2
14409/1	1849	S			19 / 34	traces of fire	some small black grits	few white big grits	out: 2.5YR light red 6/8; in: 2.5YR light red 6/6; core: 7.5YR pinkish gray 7/2	restored whole
14405b/1	1849	S			38 / -	traces of fire	many quartz grits	-	out: 2.5YR reddish brown 4/3; in: 2.5YR red 5/6; 10YR very dark gray 3/1	2
10584/1	4301	U3B	2	9.9 /			basalt, medium, small	chalk, little, coarse	out: 2.5YR 6/6; in: 5YR 6/6; core: 10YR 6/3	restored
12155/2	5447	W3	3E	10 /			basalt, much, m	chalk, little, coarse	surfaces: 7.5YR pink 7/4; core: 7.5YR 5/4	rim-neck
12071/3	5423	W2	6G3	9 /		or SJ02A	basalt, much, medium	chalk, little, medium	out: 7.5YR pink 7/4; in 5YR 7/4; core: 7.5YR 6/4	rim shard
12141/1	5447	W3	3E	8 /			basalt, much, m.	chalk, medium, c.	surfaces: 2.5YR 5/6; core: 10YR 6/3	rim-neck

SJ03 Amphorae



Appendix 5G Jars

SJ03 Amphorae



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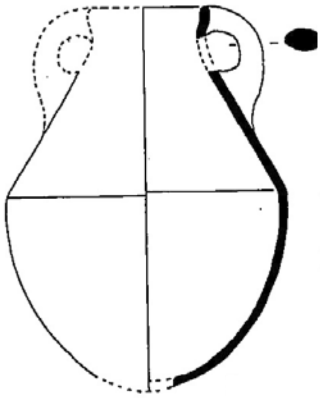

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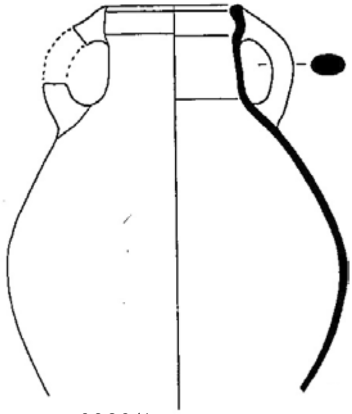

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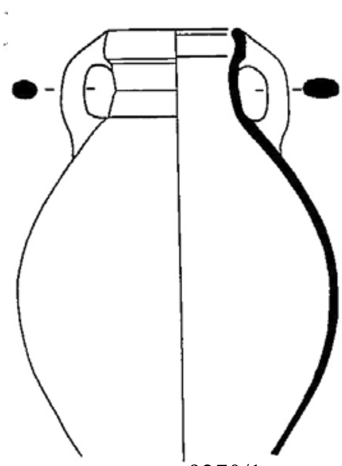

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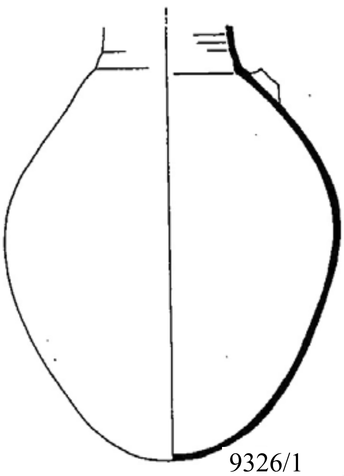

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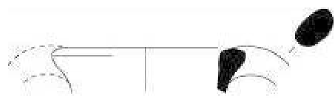
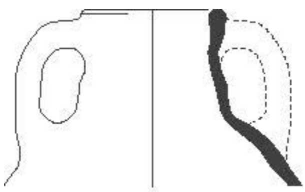


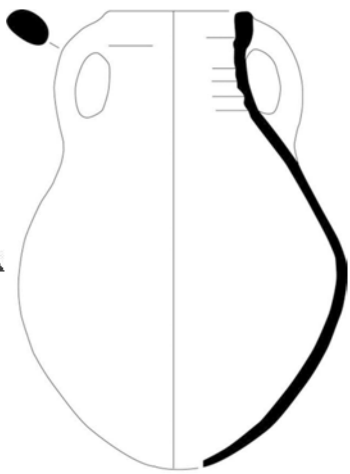
2,5 cm

L6488-11573-1



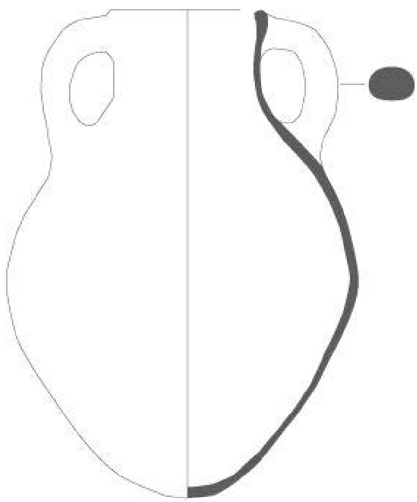
2,5 cm

L.11317



2,5 cm

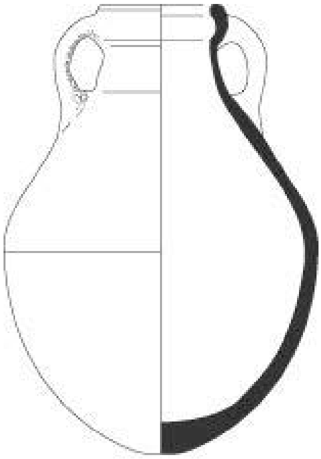
L.11327



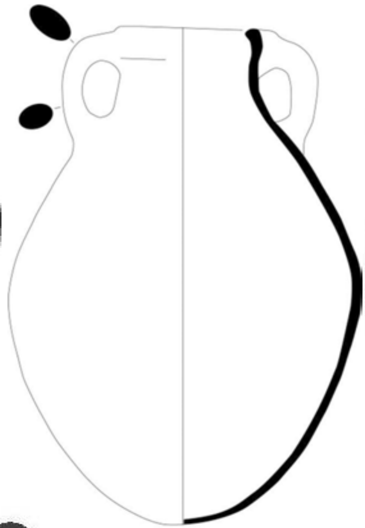
2.5 cm

L9904-11075/12

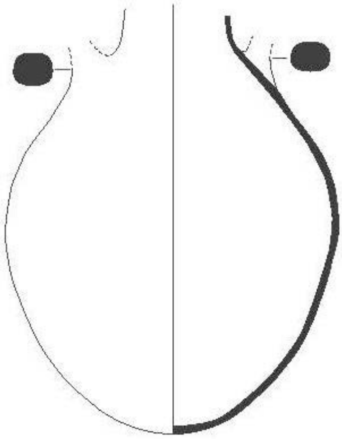
SJ03 Amphorae



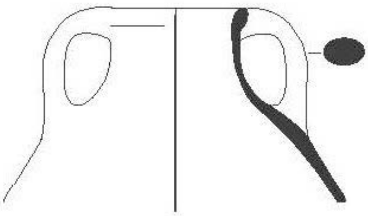
10128/1 V



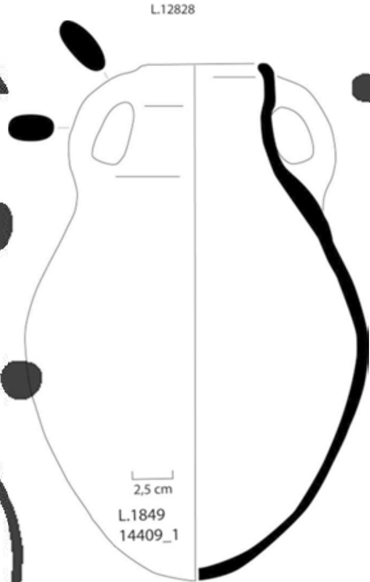
2,5 cm
L.12828



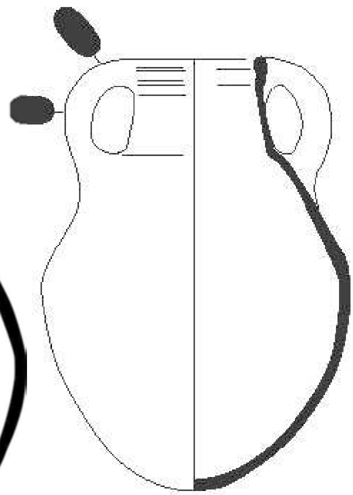
2,5 cm
12825_1



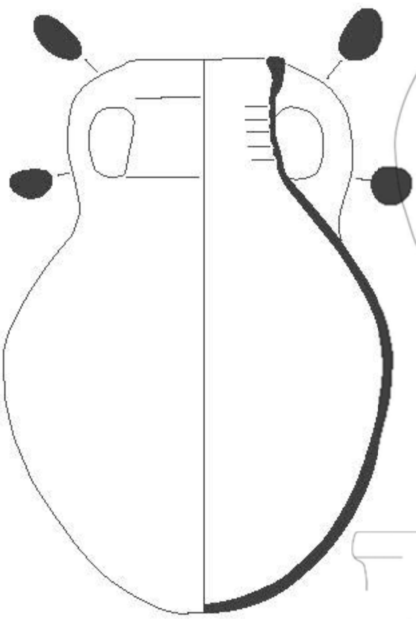
2,5 cm
L.6673
14048_4



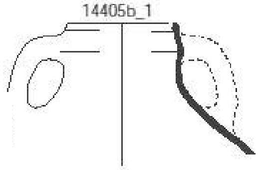
2,5 cm
L.1849
14409_1



2,5 cm
L.1849
14405b_1

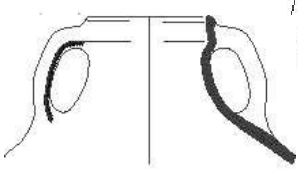


2,5 cm
10548_1



2,5 cm
L.12155

2,5 cm
L5423-12071/3

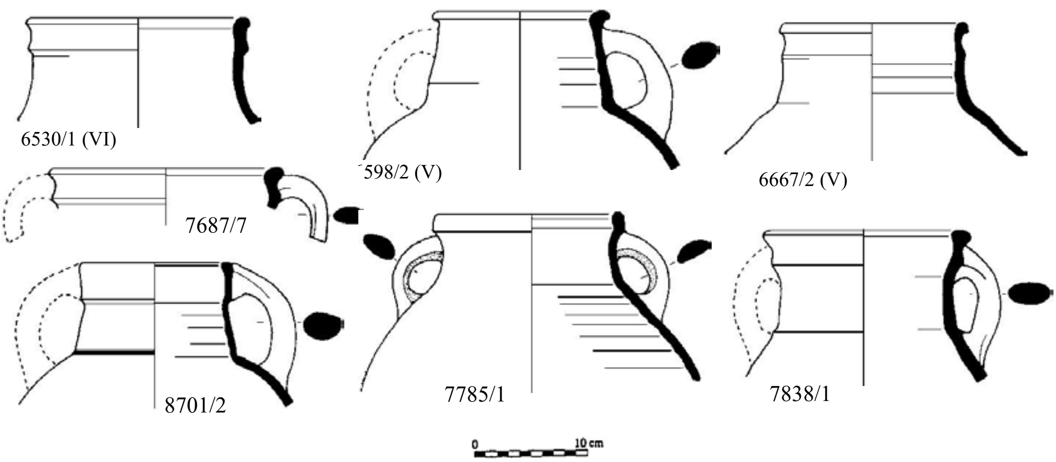


2,5 cm
L5443-12141-1

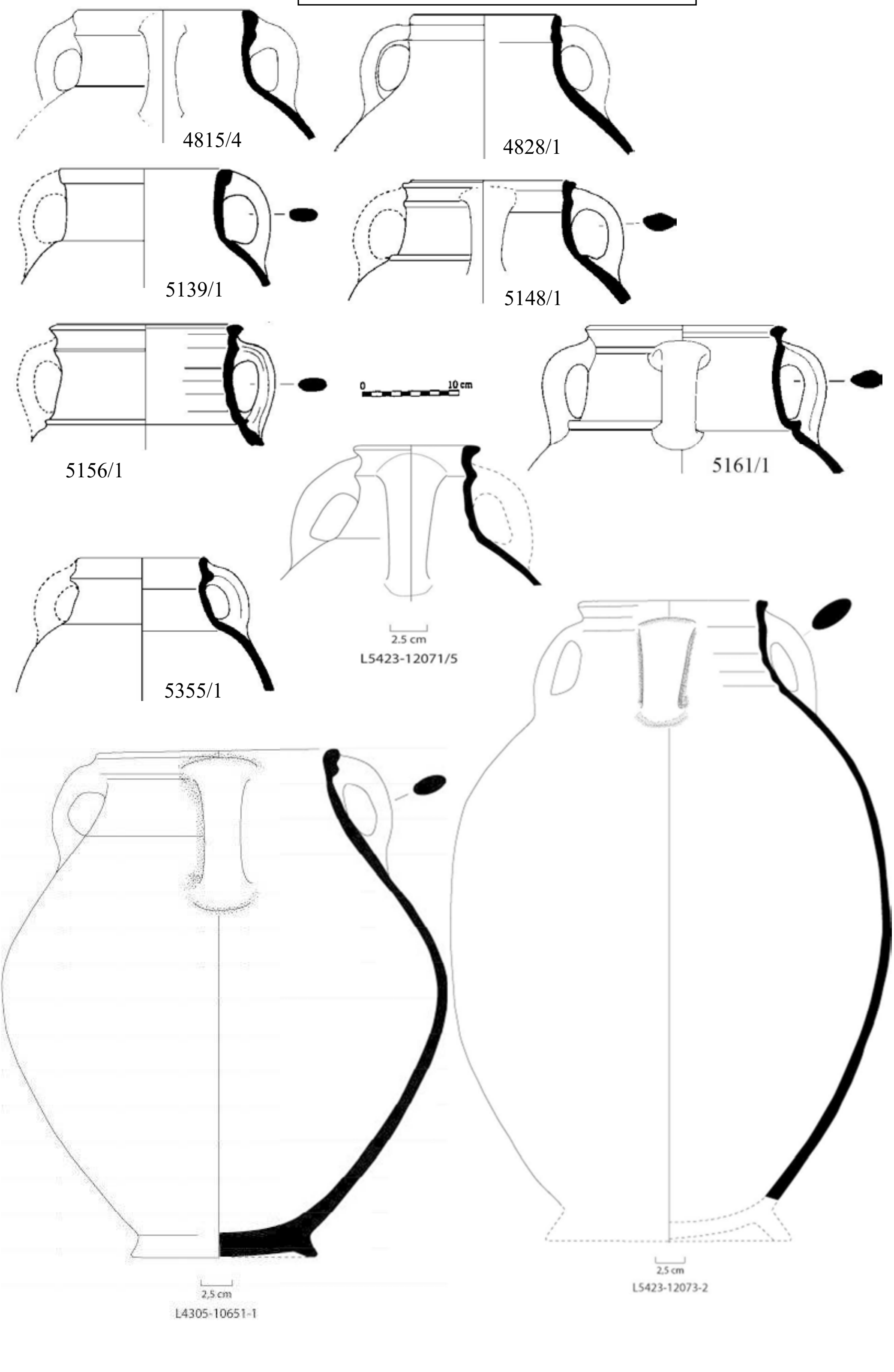
Appendix 5G Jars

SJ04 Wide Necked Amphora-Jars

Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width /neck height cm	remarks	main temper	second temper	color	preser-vation
6530/1	3560	N / VI	3E			many black and white small grits	few white, big grits	surface & core: 5YR reddish yellow 6/6	rim-neck
6598/2	3578	N1 / V	5AB			many black, brown, and white small grits	few white, big grits	surface: 5YR reddish yellow 7/8; core: 10YR very pale brown 7/4	rim-shoulder
6672/2	3599	N1 / V	3E			many white and black small grits	many big white grits	surface: 5YR pink 7/3; core: 7.5YR pink 7/4	rim-neck
7687/7	5277K	K / V	3E			many black and white small grits	white, big grits, traces of organic	surface: 5YR reddish yellow 6/6; core: 10YR gray 5/1	rim shard
7785/1	5300	K / V	11	10.5 / 7		many white small grits	few white, big grits	surface: 10YR very pale brown 7/3; core: 10 YR dark gray 4/1	rim to shoulder
7838/1	5309	K / V	3E	17 / 8		many brown and white small grits	few brown and white big grits, traces of organic	surface: 5YR reddish yellow 7/6; core: 7.5YR pinkish gray 6/2	rim-neck fragment
8701/2	5237	K / V	3	10 / 8.5		many black, gray, and white small grits	white and gray big grits	surface: 5YR reddish yellow 7/6; core: 10YR brown 5/3	rim to shoulder
4815/4	1809	F3 / V	3E	17.5 / 7.5	three handles	many black and white small grits	few white, big grits	surface: 5YR reddish yellow 7/6; core: 5YR yellowish red 5/6	whole rim-neck
4828/1	1809	F3 / V	3E	16 / 8		many black and white small grits	few white, big grits	surface: 5YR reddish yellow 7/8; core: 10YR light gray 7/2	rim-neck fragment
5139/1	2050	G2 / V	3	16.5 / 7		few gray, many brown and white small grits	many big white grits	surface: 7.5YR pink 7/4; core: 7.5R light brown 6/4	rim-neck fragment
5148/1	2050	G2 / V	3E	17.5 / 7.5		brown, many gay, and white small grits	few brown, many gray, and white big grits	surface: 5YR reddish yellow 7/8; core: 10YR grayish brown 5/2	rim-neck fragment
5156/1	2050	G2 / V	3E			many brown and white small grits	big white grits	surface: 7.5YR reddish yellow 7/8; core: 7.5YR pinkish gray 6/2	rim-neck fragment
5161/1	2050	G2 / V	3E thick	25 / 7.5	four handles	many brown and few white small grits	few white, big grits	surface: 5YR reddish yellow 7/8; core: 5YR reddish yellow 6/6	large rim-neck
5355/1	2136	G1 / IV	3E	10 / 6		many quartz, white, and black small grits	few white and gray big grits	surface: 5YR reddish yellow 6/8; core: 7.5YR pinkish gray 6/2	rim to shoulder
10651/1	4303	U3A	3E	17 /		basalt, much, small	chalk, little, coarse	surfaces: 2.5YR 6/8; core: 10 YR 6/2	restored
12073/2	5423	W2	3E	14 /		basalt, much, small	chalk, medium, coarse	out: 7.5YR 7/6; in: 7.5YR pink 7/4; core: 7.5YR 6/6	restored
12071/5	5423	W2	3E	13 /	drawing is too narrow!	basalt, much, small	chalk, little, coarse	surfaces: 7.5YR pink 7/4; core: 10YR 6/3	rim-neck



SJ04 Wide Necked Amphora-Jars



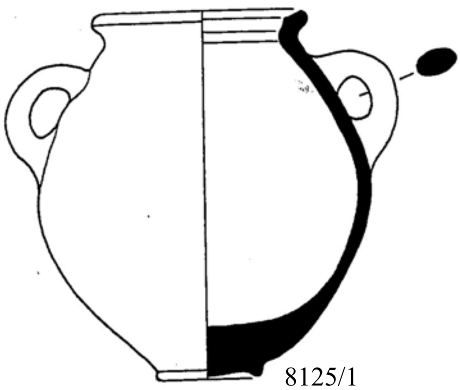
SJ04 Wide Necked Amphora-Jars

10947/1

10480/2

Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width /neck height cm	remarks	main temper	second temper	color	preser-vation
10947/1	4348	N-KRP-3	3E	8.5		basalt, much, medium	chalk, little, coarse	out: 7.5YR pink 7/4; in: 2.5YR 6/6; core: 10YR 6/3	large fragment
10480/2	4269	U0/U3	3E			basalt, much, medium	chalk, medium, coarse	out: 10YR 7/3; in: 7.5YR pink 7/4; core: 7.5YR 6/3	large fragment

SJ04B Wide Jar-Amphoriskos

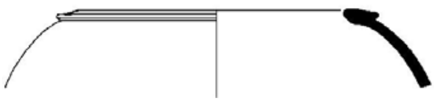


8125/1

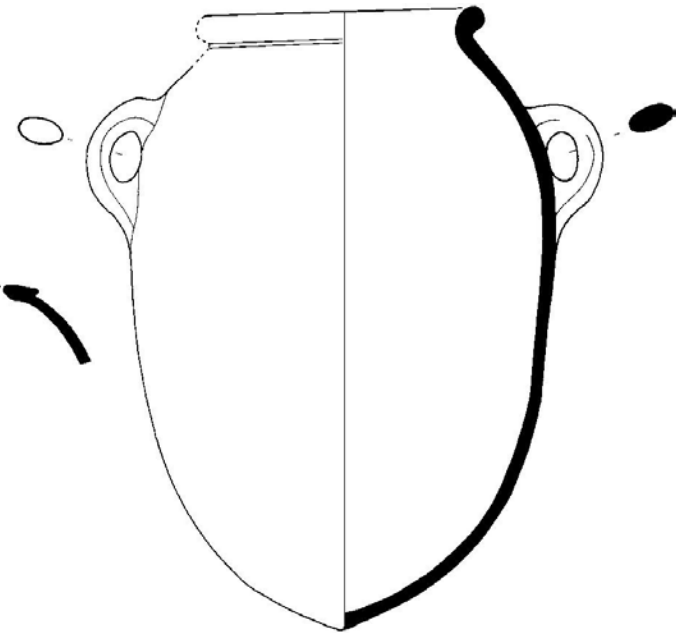
SJ04B Wide Jar-Amphoriskos								
Reg. no	Locus	phase/ Stratum	Rim type	remarks	main temper	second temper	color	preser-vation
8125/1	5038	K2 / V	5	traces of self-slip	white and gray small grits	big white grits	surface: 5YR reddish yellow 6/8; core: 7.5YR light brown 6/3	restored 60 %

SJ05 Hole-mouth Jars

Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width cm	remarks	small grits	big grits	color	preser-vation
8039/1	5017	K2 / V	6H	20		chalk, much, small and coarse	dark minerals, medium, medium	surface: 7.5YR pink 7/4; core: 5YR reddish yellow 7/6	rim shard
8517/1	5100	K2 / V	5AB	23		many black and white small grits	white and gray big grits	surface: 5YR reddish yellow 7/6; core: 10YR very pale brown 7/4	restored 95 %



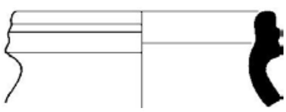
8039/1



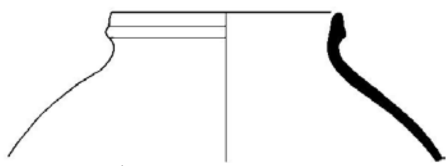
8517/1

SJ06 Short Necked Jars

Reg. no	Locus	Area-phase/ Stratum	Rim type	Rim width/ neck height cm	remarks	main temper	second temper	color	preser-vation
6598/4	3578	N1 / V	3F			many black and white small grits	few gray and white, big grits	surface: 5YR reddish yellow 6/6; core: 10YR pale brown 6/3	rim shard
8197/1	5051	K2 / V	11D	18 / 4		many white and black small grits	very few white, big grits	surface: 10YR very pale brown 8/3; core: 5YR reddish yellow 6/6	rim-neck fragment



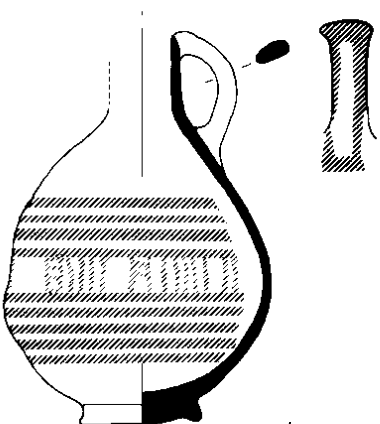
6598/4



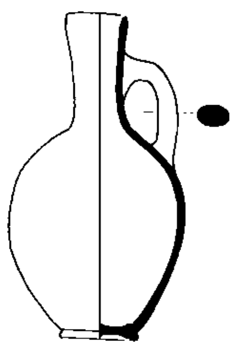
8197/1

JG01A Oval Jugs with a Tall, Narrow Neck										
Reg.no	Locus	Phase/ stratum	Pres	Width mm	height mm	rim width	Surface/other remarks	Small grits/Main temper	Big grits/Second temper	color
8517/2	5100	K2/V	2-3	160	>240	45	red (2.5YR 5/4) stripes	Many white & gray	Many white	surface & core: 7.5YR light brown 6/4
6681/1	3599	N1/V	3	110	200	35	-	Very few white & black	Very few white & black	surface: 7.5YR reddish yellow 6/6; core:7.5YR pinkish gray 6/2
9613/1	6178	R/V	2-3	135	>190	40	Grooved lines	Very many black & white	Very few white	surface: 10YR dark grayish brown 4/2; core: 10YR dark gray 4/1
10239/31	4218	U3B	2	-	-	-	-	Dark minerals, much, small	Chalk, little, medium	surfaces: 7.5YR 7/4; core: 10YR 6/3
10422/1	4276	U3B	1	-	-	40	-	Dark minerals. med. M	Quartz, little, coarse	surfaces: 2.5YR 6/6; core: 2.5Y N3
10625/6	4312	U3B	1	-	-	50	Red (10R 5/8) stripe on rim	Basalt, much-med, small-medium	Chalk little-med, medium-coarse	surfaces & core: 2.5YR 6/6
10642/5	4312	U3B	1	-	-	52	Vert. burnish	Chalk med, med.	Quartz, very little M	surfaces: 10R 6/6; core: 7.5YR 6/3
10759/1*	4329	U3B	3		?	75		Basalt, medium, small	Chalk, medium, coarse	out: 10YR 7/2; in: 5YR 6/3; core: 5YR 5/3
10796/1	4301	U3B	1	-	-	50	Vert. burnish	Quartz, little, coarse	Dark min. little, sm	surfaces: 2.5YR 6/6; core: 7.5YR 6/3
10674/8	4312	U3B	1	-	-	45	pinched mouth	Basalt much S	Chalk little C	out: 5YR pink 7/4; core: 10YR 5/2
10776/3	4328	U3B	2				Vertical burnish	Dark minerals. little, medium	Quartz, little, small	surfaces: 2.5YR 6/6; core: 7.5YR 6/4
12086/7	5432	W3	1	-	-	35	-	Basalt, med. small	Chalk, little, med.	surface: 5YR 7/4; core: 10YR 5/2
12128/3	5445	W2	1	-	-	50	-worn	Basalt, much, coarse	Chalk very little C	out: 7.5YR 6/3; in: 10YR 6/3; core: 10YR 6/2
12875/1	1729	S	2	115	>170	50	Red 2.5YR 3/3 stripes	Quartz medium, medium	Chalk, little, coarse	out: 2.5YR light red 6/6; in: 7.5YR brown 5/2; core: 5Y dark gray 4/1
12807/1	1721	S	3	135	190	40	Red 2.5YR 4/6 stripes	Chalk little coarse	Organic, medium, small	out: 10YR 5/3
4083/1	1225	E2/IV	2	150	>200	50	Red (2.5YR 5/8) slip	Much straw	Few white, gray, brown grits	surface: 5YR reddish yellow 6/6; core: 5YR dark reddish brown 3/2
10276/4	4211	U1	1	-	-	50	-	Chalk, much, small	Dark minerals, little, medium	out: 10YR 8/2; in: 10YR 7/2; core: 2.5Y N6
12068/13	5419	W1	0	190	-	-	Red & gray stripes, white slip	Basalt, medium, medium	Chalk, little, small	out: 5YR pink 7/4; in: 10YR light gray 7/2; core: 10YR 6/3
*There are no traces of a second handle, as in the drawing, see the photo beside the drawing										

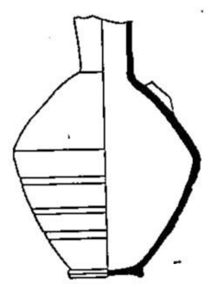
Pres= Preservation: 0=body shard, 1=rim shard, 2=larger fragment, 3=almost whole/whole vessel or a vessel profile



8517/2



6681/1



9613/1

JG01A Oval jugs with Tall and Narrow Neck

10239/31

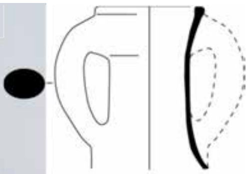
10796/1
& 10776/3

2,5 cm

L.10796_1

diam 45 mm

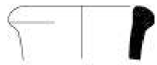
L.10674_8



2,5 cm

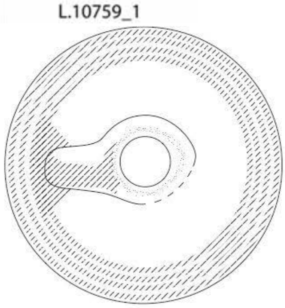
L.10759_1

10625/6



2,5 cm

L6479-11561-2



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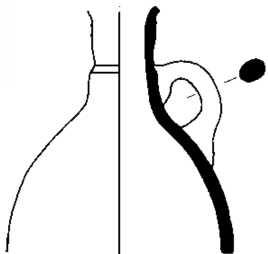

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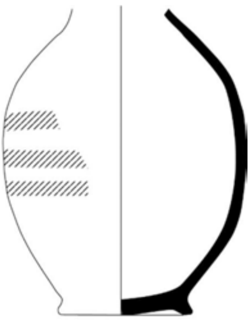

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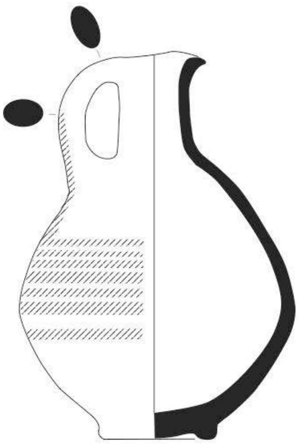

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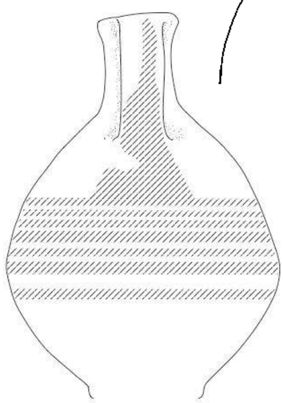
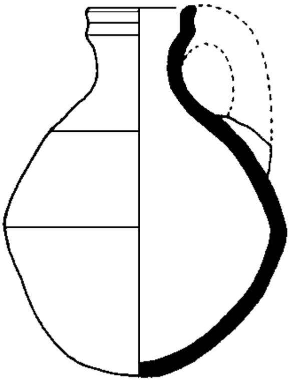


Note: pictures are not exactly in the same scale.

The size information is in the table above

JG01B Globular Jugs with Narrow Neck										
Reg.no	Locus	Phase/ stratum	Pres	width mm	height mm	Neck w/h	remarks	Small grits/ Main temper	Big grits/ Second temper	color
7173/1	4056	J2 VI	3	185	245	50/55	-	Many gray, white, black, red	Few red, many white	surface: 10YR very pale brown 8/4; core: 7.5YR pink 7/4
8521/1	5100	K2 V	2-3	255	350	70/	-	White	white, few red and gray	surface: 5YR reddish yellow 6/8; core: 7.5YR light brown 6/4
8867/1	5269	K2 V	3	130	170	40/55	-	Many white & gray	Few white & gray	surface: 5YR reddish yellow 7/8; core: 10YR grayish brown 5/2
9395/1	6140	R					red 2.5YR 4/4 bands	very many small black grits	some white small and big grits	surface & core: 10YR very pale brown 8/3
11200/8	9969	R- V	1	-	-	43	-	Basalt, much, small	Chalk, little, Coarse	surfaces: 5YR pink 7/4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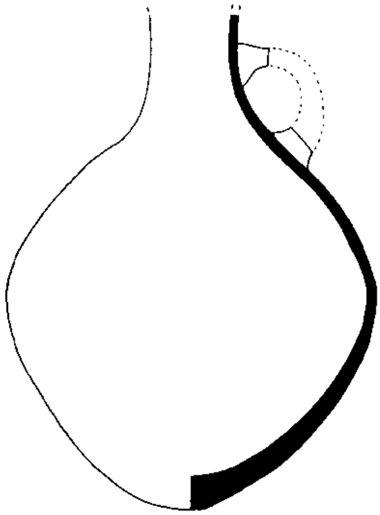
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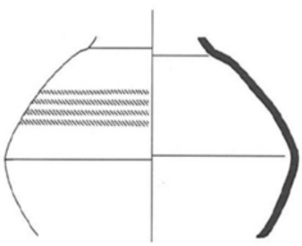
8867/1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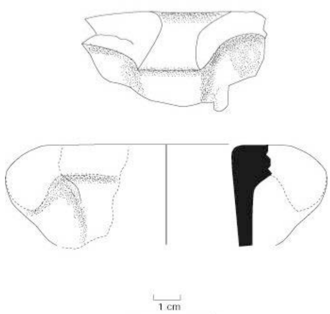


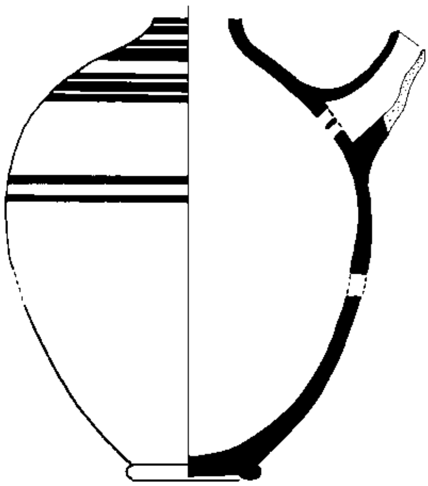
L9969-11200/8

Appendix 5H Jugs

JG02A Large Strainer Jugs										
Reg.no	Locus	phase	Pres	width	Height	Neck w	Surface	Small grits/Main temper	Big grits/ Second temper	color
8194/1	5038	K2 V	2	200	>250	40	Dark gray (5YR 4/1) stripes	Many gray & white	Few gray & white	surface: 7.5YR reddish yellow 7/6; core: 10YR gray 5/1
10513/1	4275	U3B	0	220	-	-	Red (1R 4/3) stripe	Basalt, medium Small	Chalk, little Coarse	surfaces: 2.5YR 6/4; core: 7.5YR 6/4

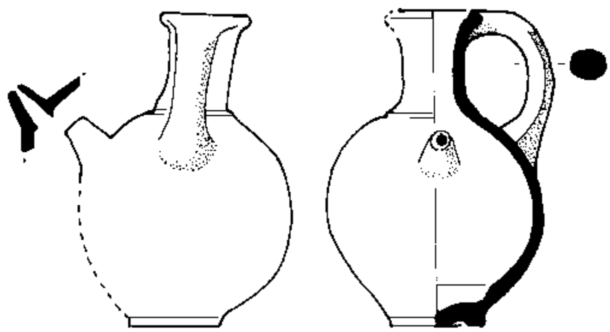
JG02B Small Jugs with a Tubular Spout										
Reg.no	Locus	phase	Pres	width	Height	Neck w/h	remarks	Small grits/ main temper	Big brits/ second temper	color
7810/1	5311	K VI	3	105	150	30 / 50		Few white	Few white big grits	surface: 10YR very pale brown 7/3; core: 10YR gray 5/1
5540/1	2213	Q -	0**	-	-	-	-	Many black, white	White, few gray	surface: 10YR light brownish gray 6/2; core: 10YR dark gray 4/1
6677/1	3599	N1 V	0**	-	-	-	-	-	-	-
10773/1	4328	U3B	2	200	>200	-	Brown 7.5YR 4/2stripes	Chalk, medium, coarse	Basalt, medium, medium	out: 5YR 5/6; in: 5YR 6/6; core: 10YR 4/1
10969/1	4360	U2	0**	-	-	-		Basalt, much, medium	Chalk, little, coarse	surface: 2.5YR 6/4; core: 7.5YR 4/3
**spout only										

JG02A Large Strainer Jug



8194/2

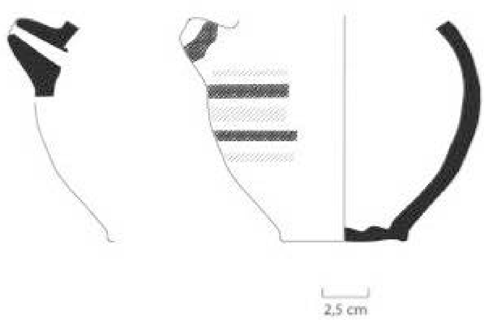
JG02B Small Jugs with Tubular Spout



7810/1

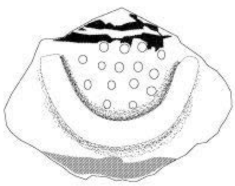
5440/1

6677/1



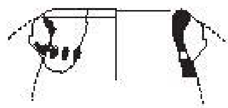
L.4328
10773_1

Reg.no	Locus	phase	Pres	width	Height	Neck w	Surface	Main temper	Second temper	color
JG02C Squat Beer Jugs										
12631/2	3795	S	0	150	-	-	Red slip, brown 10YR 4/2 paint	Dark minerals, little, medium	Chalk, little, medium	out: 2.5YR 7/6; in: 5YR 7/4; core: 10YR 5/1
12051/2	5420	W1	0	200	-	-	-	Basalt, medium, small	Chalk, medium, coarse	out: 7.5YR 7/4; in: 5YR 6/4; core: 7.5YR 6/2
12149/15	5448	W3	0	-	-	-	-	-	-	out: 2.5YR light red 6/6
10863/11	4343	U3B	0				Red slip, burnish	Chalk, little, medium	Basalt, very little small	out: 5YR 5/6; in: 5YR 7/4; core: 5YR 6/6
10890/1	4347	U3A	3	100	>110	65	Red slip, burnish	Basalt, much, small	Quartz, medium, medium	surfaces: 5YR 7/6; slip: 10R 4/4
10207/1	4201	U0	1	-	-	74	-	Basalt, much, small	Chalk, medium, coarse	surfaces: 10YR 7/4; core: 5Y 5/1
JG2D basket handle										
11157/8	9948	R	1		red 10R 4/4 stripes and brown 7.5YR 4/2 wavy lines			few gray grits	few big white grits	surfaces: 5YR pink 7/4; core: 7.5YR pink 7/4



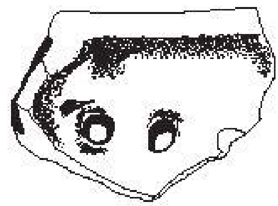
1 cm

L3795-12631-2

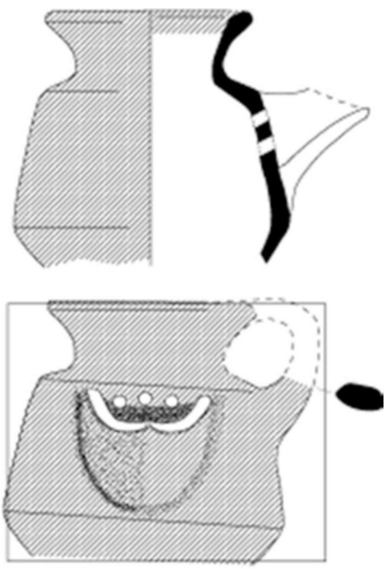


2.5cm

L4201-10207/1



1cm



2,5 cm

L4347-10890-1

10863/11

11025/24

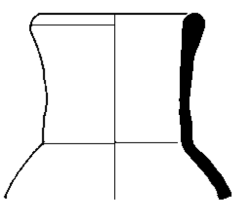
JG02D Basket handle

2.5 cm

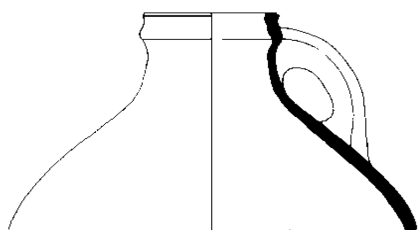
L9948-11157/8

Appendix 5H Jugs

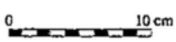
JG03A Rounded Jugs with a Tall and Wide Neck									
Reg.no	Locus	phase	Pres.	Width	Height	Neck w/h	Small grits/Main temper	Big grits/ Second temper	color
6464/1	3517	N2 VI	1-2	-	-	80/80	Many white	Many white, gray	surface: 5YR reddish yellow 6/6; core: 10YR gray 5/1
4815/3	1803	F3 V	2	250	-	75/60	Many black, gray	Few gray	surface: 2.5YR light red 6/8; core: 10YR dark gray 4/1
4815/5	1803	F3 V	3	190	210	80/55	Many black, white	White	surface: 5YR reddish yellow 6/8; core 7.5YR pinkish gray 6/2
7454/2	4159	J1 V	3	220	300	80/70	Many white & gray	Few white	5YR reddish yellow
8701/1	5237	K2 V	2	-	-	85/60	Many black & white	White, gray	surface: 10YR very pale brown 7/3; core: 7.5YR gray N5
8582/1	5126	K2 V	1-2	>170	-	80/65	Very many black, gray & white	Few white	surface: 10YR very pale brown 7/4; 5Y gray 5/1
9122/1	6032	M1 V	1-2	250	-	90/70	Many black, few white	Few white	surface: 7. 5YR reddish yellow 6/6; core: 10YR light brownish gray 6/2
6597/1	3578	N1 V	3	200	275	85/60	Many black, white	White	2.5YR light red 6/8
6598/3	3578	N1 V	2-3	175	>220	80/70	White	Few white & gray	surface: 5YR reddish yellow 6/6; core: 10YR grayish brown 5/2
9322/1	6132	R V	2-3	230	>250	75/60	Many white, very many black	White, black	surface: 7.5YR pink 7/4; core: 10YR very pale brown 7/4
9281/1	6106	R V	3	183	275	75/90	Many black, few white	Few white	surface: 2.5YR light red 6/8; core: 10YR brownish yellow 6/6
9573/1	6178	R V	3	160	260	70/60	Very many black, white	White, few gray	surface: 5YR reddish yellow 6/8; core: 7.5YR brown 5/4
7675/1	5266K	K IV	2-3	210	275	80/65	Very few white & gray	Few white & gray	7.5YR reddish yellow 8/6
7637/1	5262K	K IV	2	165	>180	75/50	Many black, white	Very few white	surface: 10YR very pale brown 8/4; core: 10YR gray 5/1
8693/1	5238	K1 IV	1-2	>160	-	90/75	Many gray, quartz & white	Few white	surface: 5YR reddish yellow 6/8; core: 5Y gray 5/1
12861/1	1729	S 2b?	3	200	230	70/63	Quartz, much M	Chalk, little M	out: 5YR reddish brown 5/4; in: 10YR very dark gray 3/1; core: 10YR dark gray 4/1
12707/1	1717, 1721	S2b	3	185	270	-	Organic, medium medium	-	surfaces: 5YR yellowish red 5/6; core: 5YR reddish brown 4/3
10226/1	4219	U1	2	310	-	90/75	Chalk, much coarse	Basalt, much M	surfaces: 10YR 8/4; core: N 5/0
12078/6	5415	W0	1			110	basalt, medium, medium	chalk, medium, coarse	out:5YR 7/4; in: 7.5YR 7/3; core: 10YR 5/3

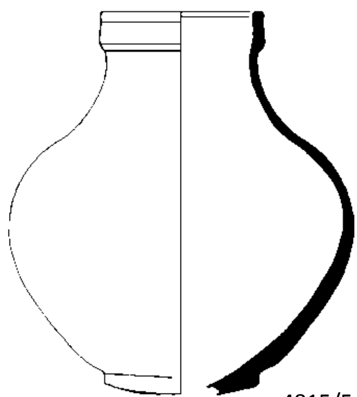


6464/1



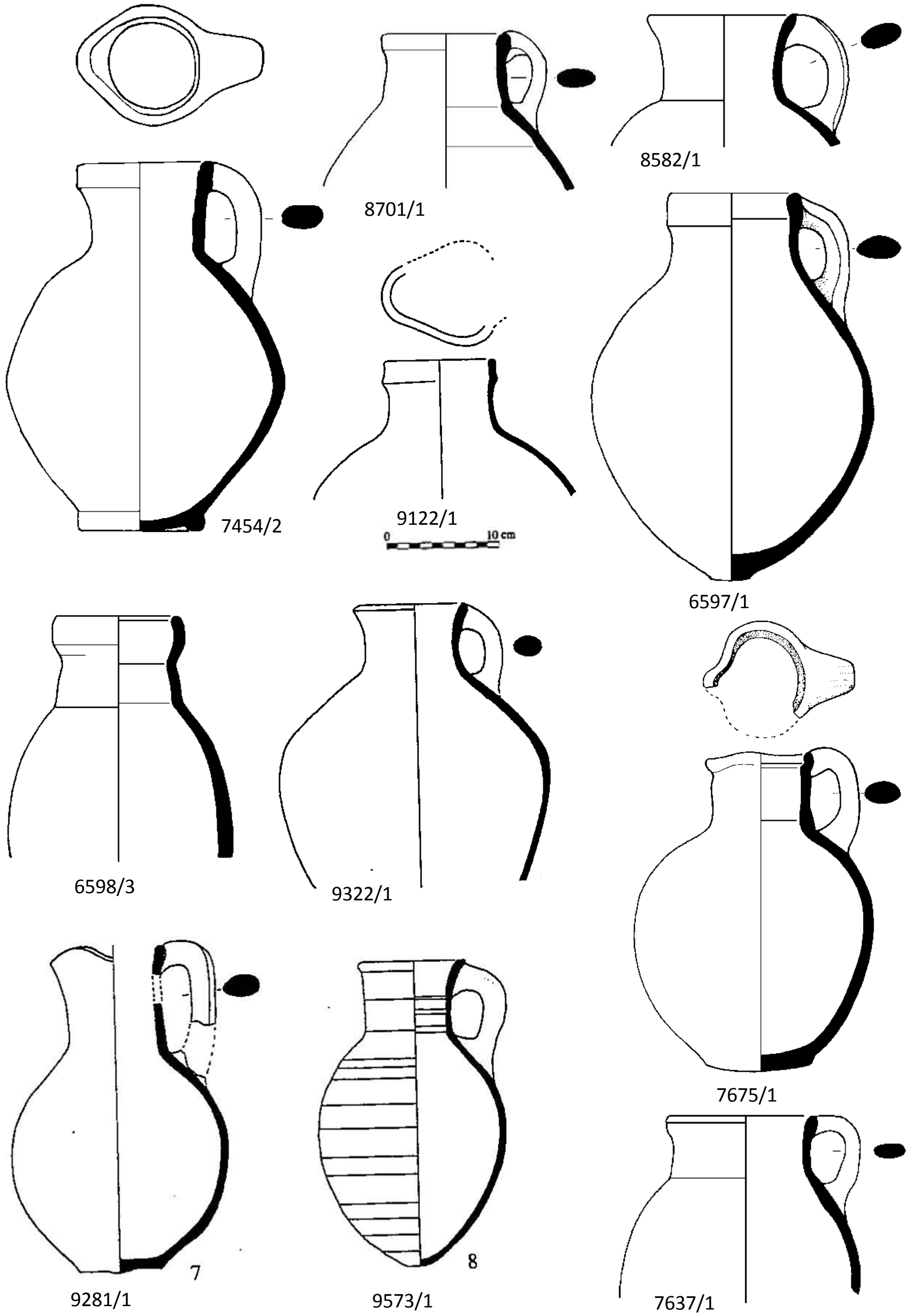
4815/3





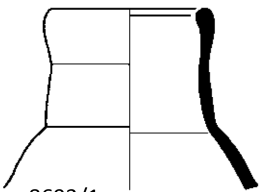
4815/5

JG03A Rounded Jugs with Tall, wide neck

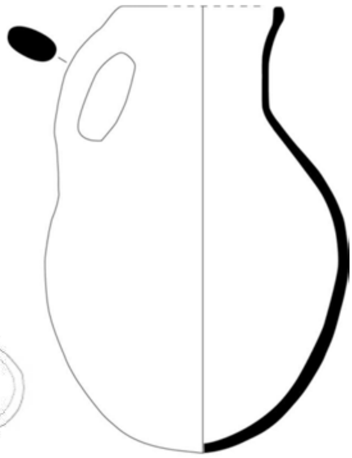


Appendix 5H Jugs

JG03A Rounded Jugs with Tall, wide neck

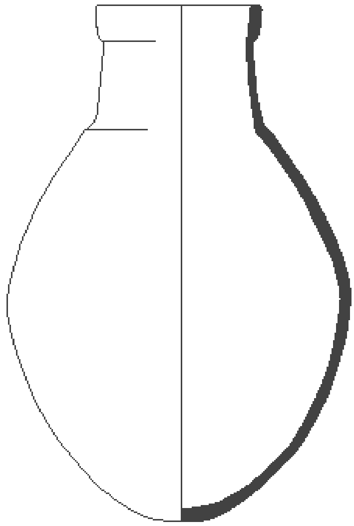


8693/1



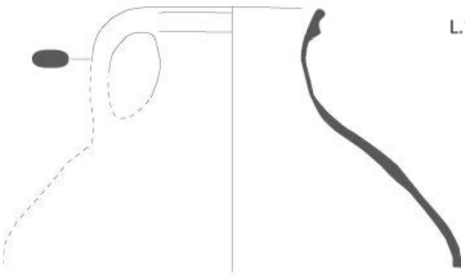
2,5 cm

L.12861_1



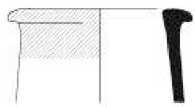
2,5 cm

12707_1



2.5 cm

L4219-10226/1

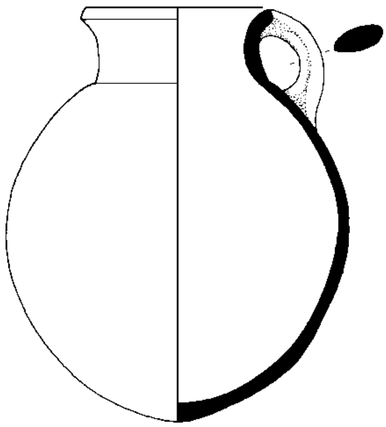


2.5 cm

L 5415-12078/2

JG03B Rounded Jugs with a Short and Wide Neck									
Reg.no	Locus	phase	Pres	Width	Height	Neck w/h	Small grits/ Main temper	Big grits/ Second temper	color
9664/1	4046	J1 V	3	180	220	80/45	Very many black	Few white	surface: 10YR yellow 7/6; core: 10YR very pale brown 7/4
8503/1	5100	K2 V	3	230	280	110/50	Black, few white & red	Few gray & white	5YR reddish yellow 7/8
7792/1	5309	K V	1	-	-	90/50	Many black & white	White, few gray	surface: 2.5YR light red 6/6 ; core: 10YR very pale brown 7/4
8700/1	5237	K2 V	2	160	-	85/42	Many black, white, gray	White, gray	surface: 5YR reddish yellow 6/8; core: 7.5YR light brown 6/4
8732/3	5237	K2 V	1						
8193/4	5051	K2 V	1-2	-	-	90/30	Very small white	-	surface: 10 YR white 8/2; core: 10YR grayish brown 5/2
9078/1	6011	M1 V	3	235	295	100/50	Gray & white	Gray & white	surface: 2.5YR red 5/8; core: 10YR light yellowish brown 6/4
9322/2	6132	R V	3	220	240	75/40	Few white	Few white	surface: 7.5YR pink 7/4; core: 10YR very pale brown 7/4


9664/1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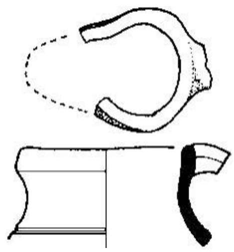
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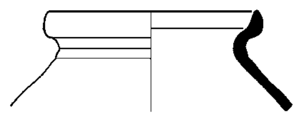
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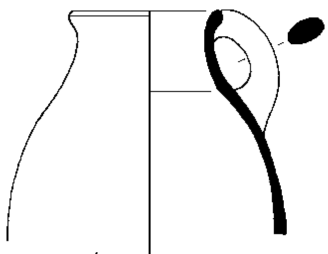
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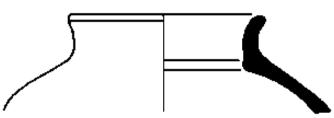
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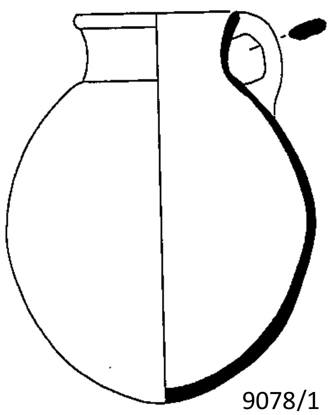
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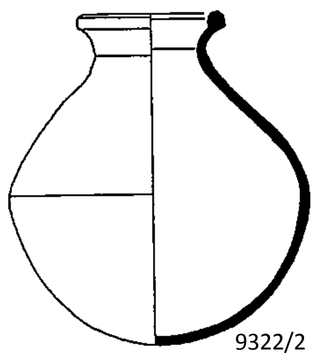
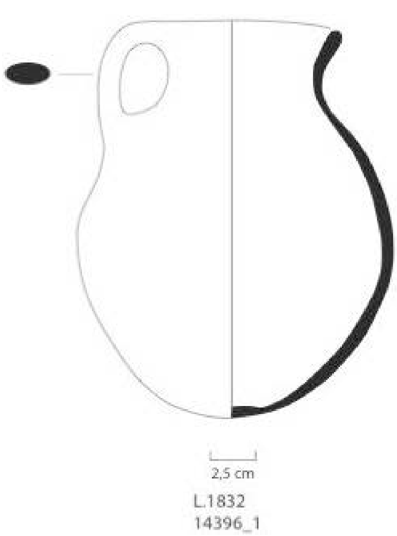
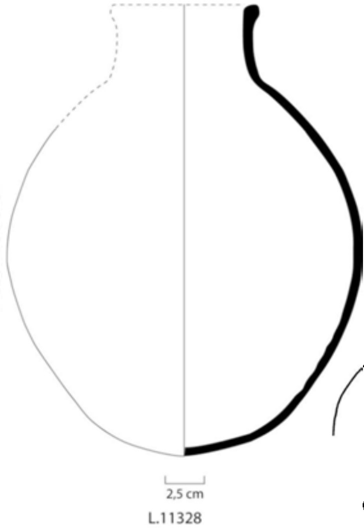
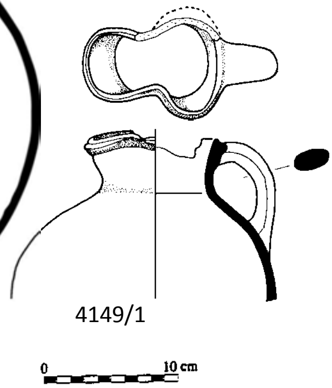

9322/2

JG03B Rounded Jugs with Short, Wide Neck



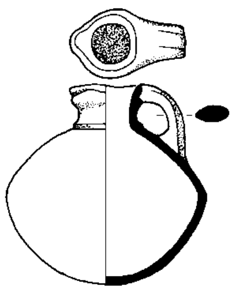




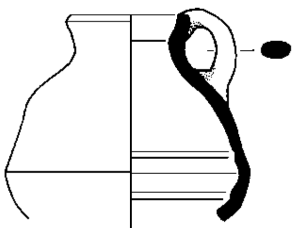
4149/1

JG03B Rounded Jugs with a Short and Wide Neck									
Reg.no	Locus	phase	Pres	width	remarks	Neck w/h	small grits	big grits	color
14396/1	1832	S	3	16 cm	20 cm high		few black	very few white	out: 5YR reddish yellow 6/6; core: 2.5YR light red 6/8
11328/1	6431	R 5a	3	21 cm	30 cm high	75/46	Quartz, medium, med.	Chalk, medium, medium	out: 2.5YR light red 6/6
4149/1	1247	E2 IV	2	21 cm	red 2.5YR 5/8 slip	76/50	Many black, red, gray	Few gray	surface: 5YR reddish yellow 6/6; core: dark reddish brown 3/2

JG03C Squat Jugs with Short and Narrow Neck



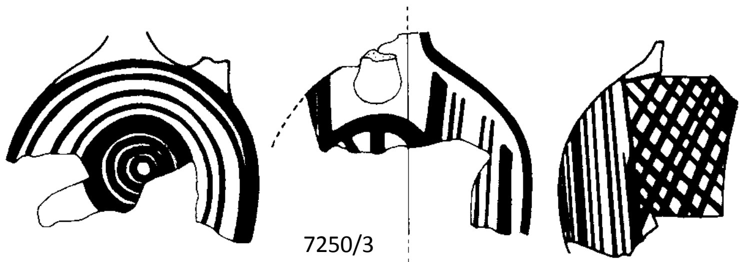
7833/1



6636/1

JG03C Squat Jugs with Short and Narrow Neck									
Reg.no	Locus	phase	Pres	Width	Height	Neck w/h	Small grits	Big grits	color
7833/1	5311	K VI	3	135	140	40/30	Black & gray	Few gray	7.5YR reddish yellow 6/6
6636/1	3599	N1 V	2-3	150	>135	58/30	Many black	Few white	surface: 7.5YR reddish yellow 7/6; core: 7.5YR pinkish gray 6/2

JG04 Decorated Jugs with Spherical Body										
Reg.no	Locus	phase/ stratum	Pres	width mm	height mm	neck width	Decoration, surface	Small grits	Big grits	color
7250/3	4088	J2 VI	2	160	-	25	Elaborate reddish brown 2.5YR 4/4 decoration	Many white	Few white	surface: 10YR very pale brown 8/3; core: 10YR light brownish gray 6/2
9657/1	4046	J1 V	3	115	175	35	Dark reddish brown (5YR 3/2) and weak red (10YR 4/4) circles	Many gray	-	surface: 10YR very pale brown 8/4; core: 10YR very pale brown 7/3
7169/1	4046	J1 V	3	170	250	40	Red (2.5YR 6/6) circles and stripes on neck and body	Many white, brown	Many white, gray, quartz	surface: 7.5YR reddish yellow 7/6; core: 10YR very pale brown 7/3
8250/1	5049	K2 V	2	-	-	35	-	Many white and gray	Few gray and white	surface: 5YR reddish yellow 6/8; core: 7.5YR pinkish gray 6/2
8443/1	5068	K2 V	2	195	-	25	Dark gray (5YR 4/1) net pattern and circles, hand-burnish	Many white	Many white	5YR reddish yellow 7/6
8546/2	5068	K V	2	180	-	-	Dark grayish brown (10YR 3/2) circles	Many white	Many white	surface: 10YR very pale brown 8/4; core: 10YR very pale brown 7/4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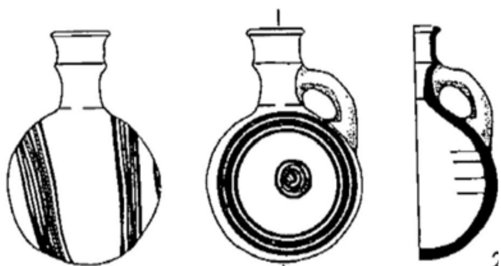
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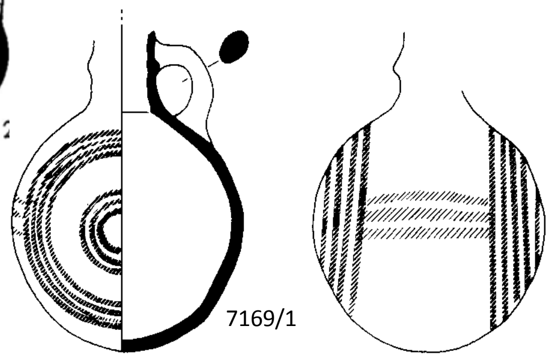
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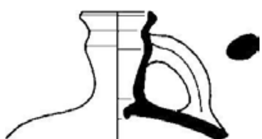
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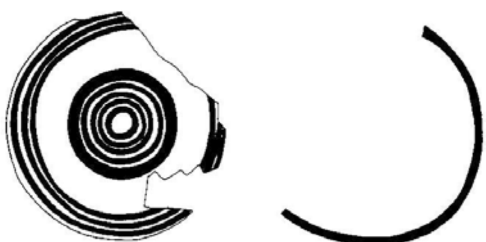
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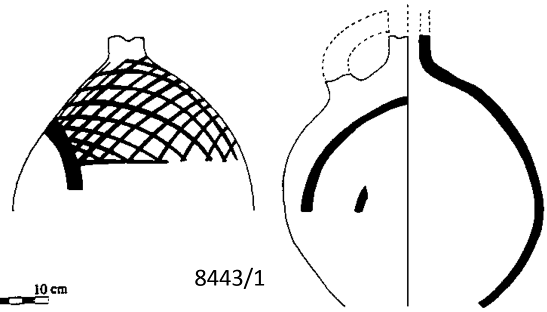
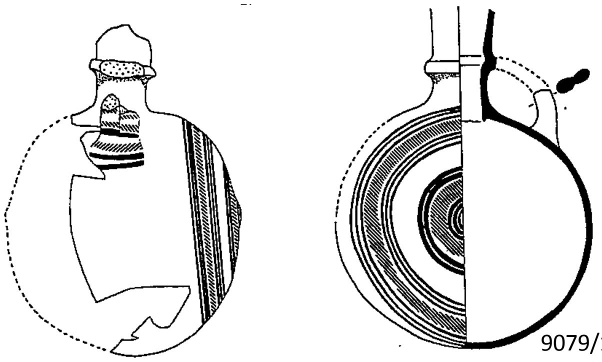

8443/1

Appendix 5H Jugs

JG04 Decorated Jugs with Spherical Body (cont.)										
Reg.no	Locus	phase/ stratum	Pres	width mm	heigh t mm	neck width	Decoration, surface	Small grits	Big grits	color
9079/1	6011	M1 V	2-3	225	300	50	Red (10R 4/6) and black (2.5YR N3) circles and stripes, burnish	Very small black	Very few white	7. 5YR reddish yellow 7/6
6621/1	3602	N1 V	2-3	135	190	35	Red (2.5YR 4/6) circles	Black and white	Few gray	surface: 7.5YR reddish yellow 6/6; core: 10YR dark grayish brown 4/2
9401/1	6132	R V	2-3	235	>250	-	Pale brown (10YR 8/3) and red (2.5YR 4/8) circles, stripes and polygons	Very small black	White	7. 5YR reddish yellow 7/6
9575/1	6143	R V	2-3	225	320	50	Red (10R 4/8) and black (?) circles	Many white and black	-	surface: 2.5YR light red 6/8; core: 2.5YR dark gray N4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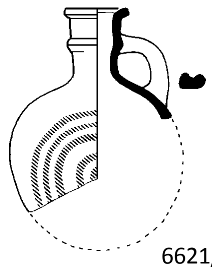
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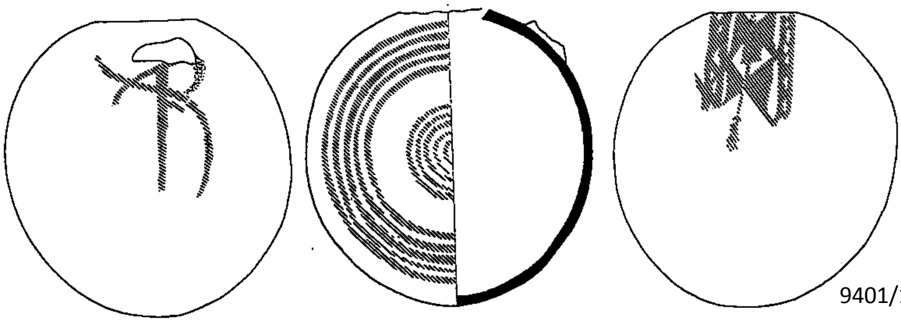
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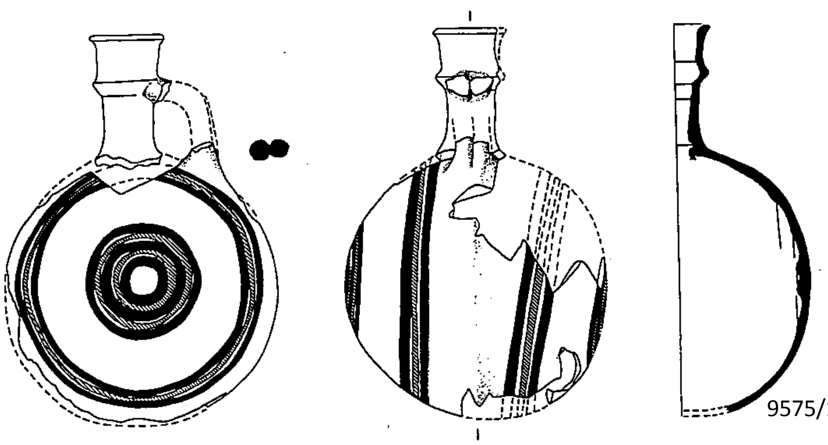
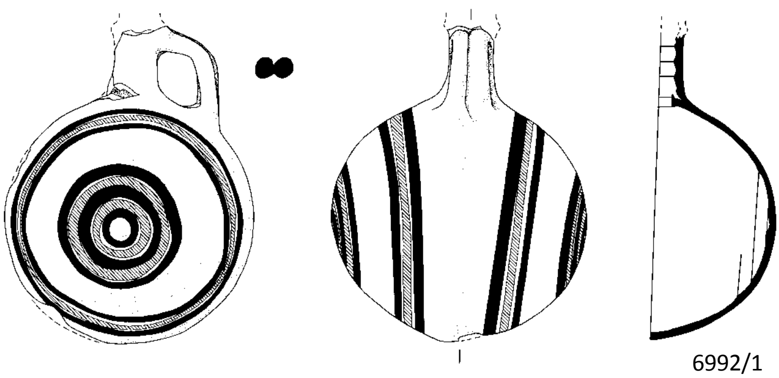

9575/1

0 10 cm

JG04 Decorated Jugs with Spherical Body (cont.)										
Reg.no	Locus	phase/ stratum	Pres	width mm	height mm	neck width	Decoration, surface	Small grits/ Main temper	Big grits/ Second temper	color
6992/1	3725	S V	2-3	220	275	35	Dark brown (7.5YR 3/2) and red (2.5YR 5/6) circles	Few small white grits	Few white big grits	surface: 5YR reddish yellow 6/8; core: 10YR brown 5/3
12815/1	1725	S	2	180	-		red (10R 4/6) and brown (10YR 3/2) circles	basalt, very little, medium	organic, little, small	out: 5YR reddish yellow 6/6; in: 10YR 5/2; core: 10YR 4/1
12876/1	1729	S	2	180	-		Dark brown (10YR 4/2) circles, net and crossing stripes; traces of burnish, white (2.5Y 8/2 slip)	Chalk, much, coarse,	Quartz, medium, medium	out: 7.5YR pink 7/4; in: 2.5Y light brownish gray 6/2; core: 10YR grayish brown 5/2
14414/1	1849	S	3				red (2.5YR 5/8) slip, gray (10R 3/1) and brown (10R 5/6) circles	basalt, very little, small	red grits, little, medium	surfaces & core: 5YR reddish yellow 7/6
11075/8	9904	R4b VA	3	190	250	35	Red (10R 4/8) and dark brown (10YR 3/1) circles; White (2.5Y N8) slip	Chalk, little, coarse	quartz, little, medium	out: 7.5YR pink 7/4; in: 2.5Y light brownish gray 6/2; core: 10YR grayish brown 5/2
11075/9	9904	R4b VA	0	-	-	-	Dark brown (7.5YR 3/2) circles & net pattern	Chalk, much, coarse	Medium, organic, medium	out: 5YR reddish yellow 6/6; in: 10YR pale brown 6/3; core: 10YR gray 5/1



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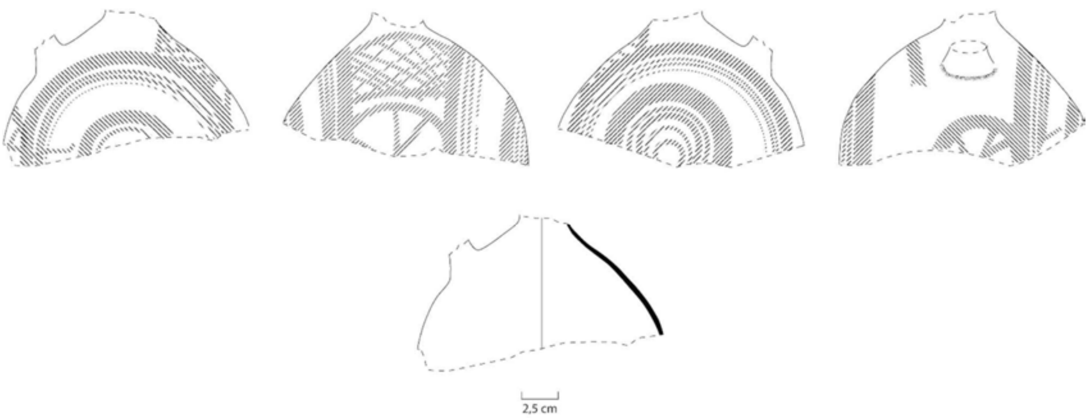
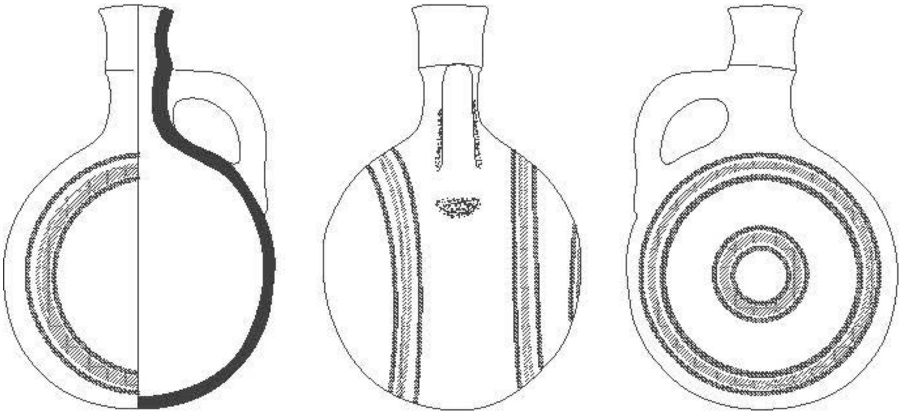


L.12876_1

Appendix 5H Jugs

JG04 Decorated hemispherical jugs



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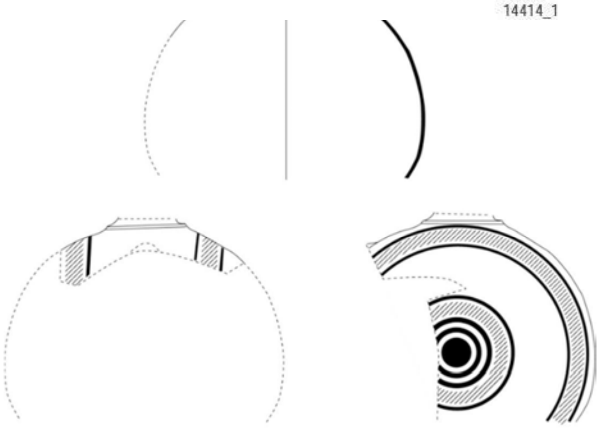
14414_1



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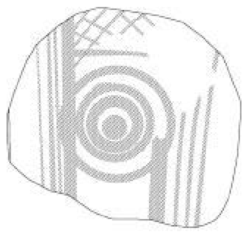

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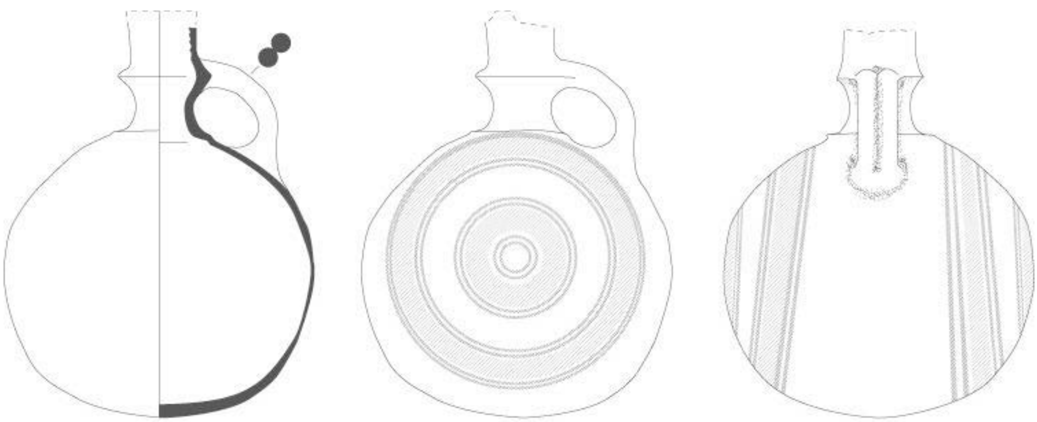
L9904-11075/9

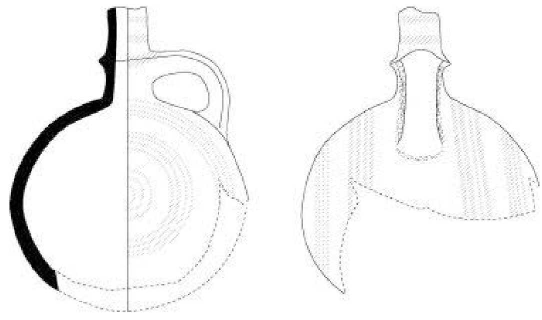


2,5 cm
L9904-11075/8

JG04 Decorated Jugs with Spherical Body (cont.)

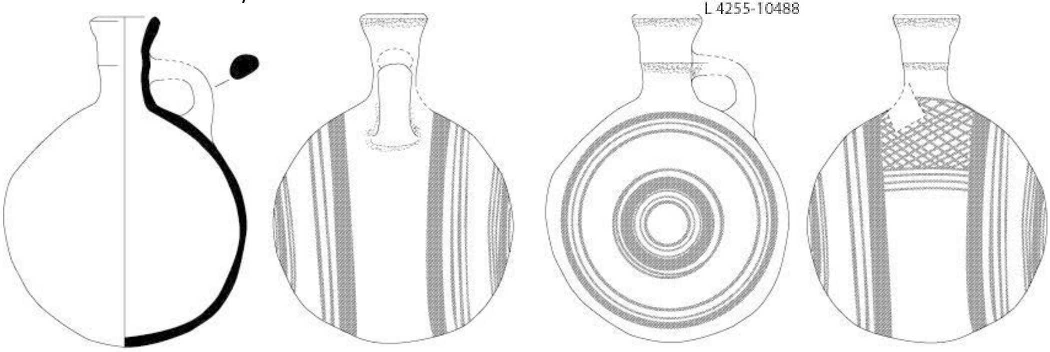
Reg.no	Locus	phase/ stratum	Pres	width mm	height mm	neck width	Decoration, surface	Small grits/ Main temper	Big grits/ Second temper	color
10427/1	4269	U3B	2	240	-	-	Dark brown (7.5YR 3/4) circles, traces of light slip	Quartz, medium, m	Chalk, little, med	out: 5YR 5/6; in: 7.5YR 6/4; core: 10YR 4/1
10488/1	4255	U3B	2-3	148	175	40?	Red (10R 4/6) circles and stripes	chalk, much, coarse	Organic, little, medium	surfaces: 7.5YR 7/4; core: 10YR 7/3
10511/8	4277	U3B	0	-	-	40	Traces of burnish	Dark minerals, little small	Sand, little, S	surfaces: 2.5YR 6/6; core: 7.5YR 6/4
10751/1	4312	U3B	3	170	230	30	Dark brown (10YR 3/2) circles, net and stripes; Vertical burnish, white (7.5YR 8/4) slip	Quartz, little, coarse	Chalk, little, coarse	out: 2.5YR 5/6; in: 2.5Y 4/1; core: N 4/0
10789/1	4328	U3B	3	150	-	35	dark brown (10YR 3/1) circles, net and stripes; Traces of burnish	Chalk, med., coarse	Quartz, little, medium	out: 2.5YR 6/8; in: 10YR 5/2; core: 10YR 4/1
10300/1	4225	U3A	3	170	240	45	dark brown (5YR 3/1) circles, net pattern and crossing stripes; Traces of burnish	Chalk, much, coarse	Basalt, medium, small	surfaces: 5YR 6/6
10310/1	4236	U3A	3	180	280	45	dark brown (5YR 3/3) circles and net pattern	Chalk, much, coarse	Organic, little, medium	out: 5YR 6/6; core & in: N 6/0
10897/5	4348	U3A	0	150	-	-	Reddish-grey circles	Basalt, little, small	Chalk, little, coarse	out: 5YR 7/4; 10YR 5/2; core: N 4/0
10944/2	4348	U3A	0				Dark grey stripes, traces of burnish	Chalk, little, coarse	Sand, little, small	out: 5YR 6/6; in: 5YR 6/4; core: 7.5YR 6/4
12021/2	5404	W1	0	-	-	-	net pattern	chalk, much, coarse	sand, medium, medium	out: 7.5YR pink 7/4; in: 5YR 7/4; core: 10YR 5/1

10427/1



2.5 cm

L 4255-10488



2,5 cm

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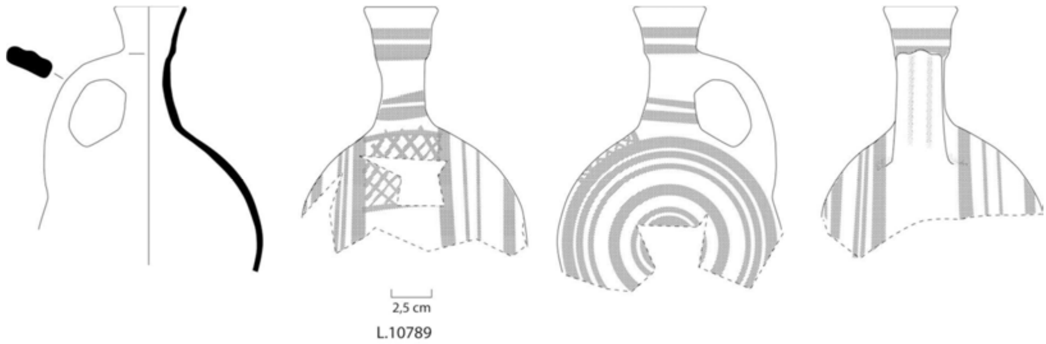
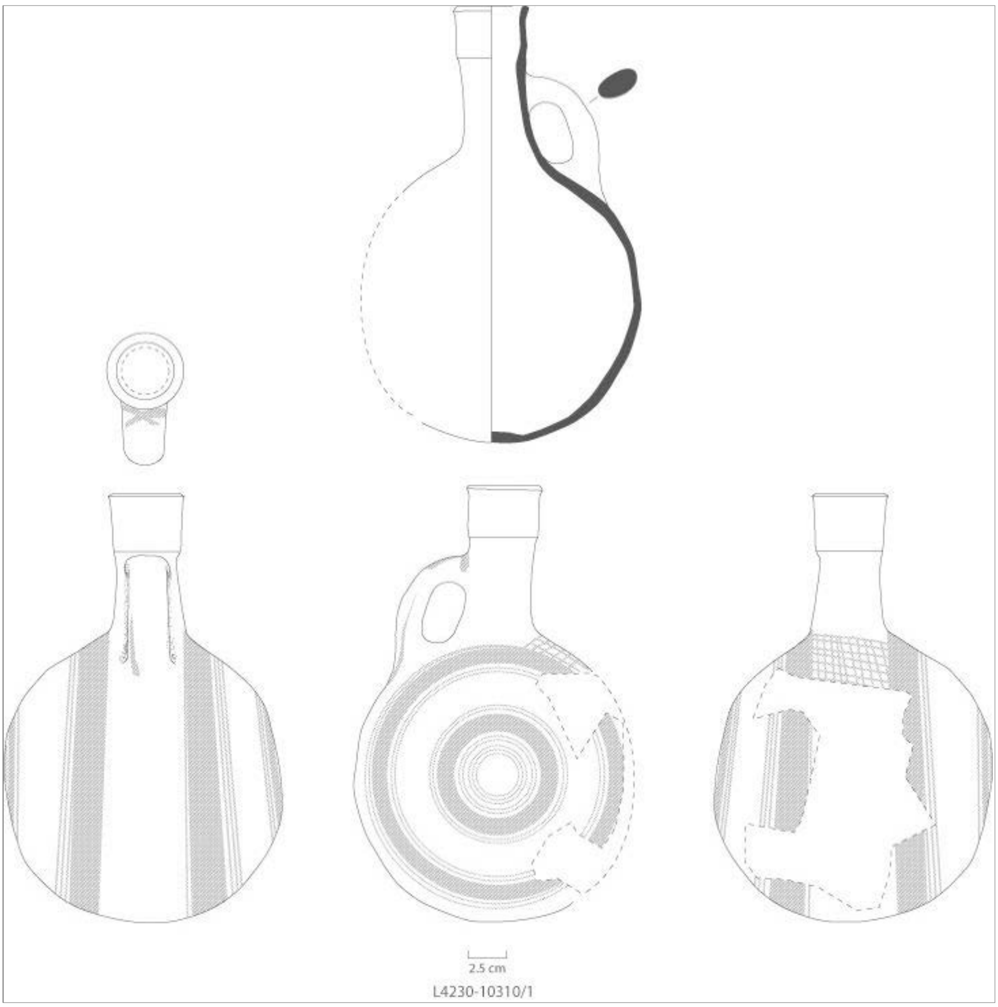
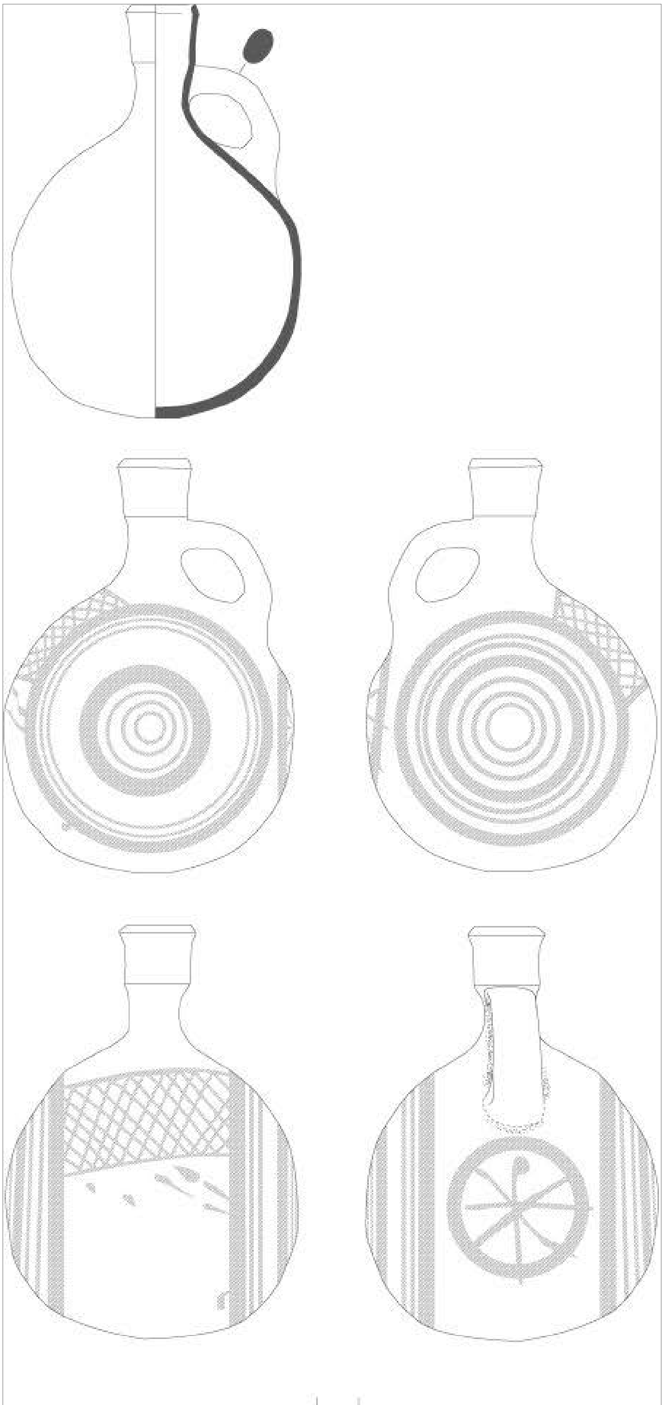
Appendix 5H Jugs

JG04 Decorated hemispherical jugs





JG04 Decorated hemispherical jugs



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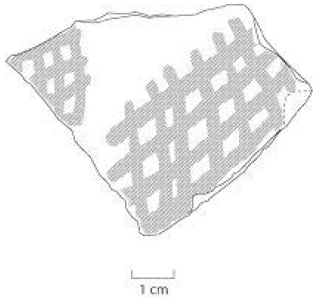

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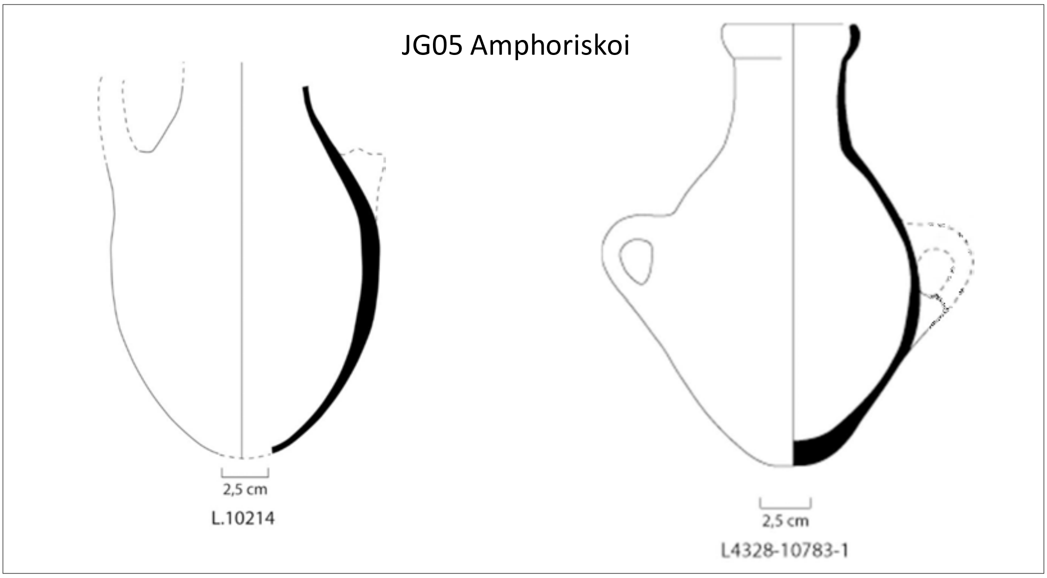
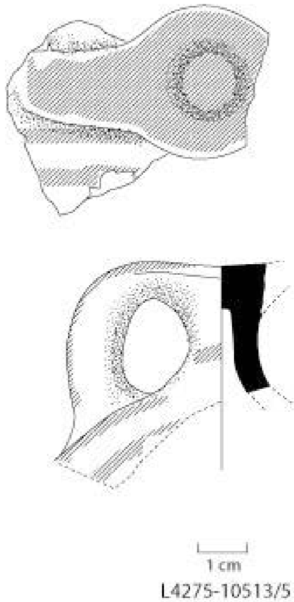
Appendix 5H Jugs



JG05 Amphoriskoi										
Reg.no	Locus	phase	Pres	Width	Height	Neck width	Surface	Main temper	Second temper	color
10783/1	4328	U3B	3	130	220	60	-	Basalt, much-medium, small	Chalk, little-medium, medium-coarse	surface: 2.5YR 6/4
10214/5 *	4204	U0	2	145	>123	60	-	Basalt, much, medium	Chalk, little, medium	out: 5YR 7/6; in: 5YR 6/6; core: 7.5YR 4/2
12066/2	5422	W0	1	-	-	100	Brown (10YR 4/2) bands	Quartz, little, medium	Basalt, very little, medium	out: 10YR 8/4; in: 5YR 7/6; core: 10YR 6/2
*The second handle is an unsure reconstruction.										

JG06 Stirrup Jars								
Reg.no	Locus	phase	Pres	Neck width	remarks	Main temper	Second temper	color
10513/5	4275	U0	1	32 mm	red 10R 4/3 decoration	basalt, medium, small	chalk, medium, coarse	out: 2.5YR 6/4; in: 10YR 5/1; core: 10YR 4/2
12410/1	3965				black 10YR 3/1 and red 10YR 3/4 semicircles	-	-	out: 2.5YR light red 7/6; in: 10YR 7/3; core: 10YR 6/3; slip: 10YR 8/1
JG07 Biconical Jug				rim Ø				
12045/6	5406	W3	1	150 mm	-	basalt, little, small	quartz, medium, small	out: 2.5YR 6/6; in: 7.5YR 7/4; core: 10YR 6/3
JG08 Small Jug-Bottle								
11162/6	9953	R		60 mm		chalk, medium, medium	organic	out: 5YR 7/4; in: 2.5YR 6/4; core: 2.5YR 6/6

JG06 Stirrup Jars



12410/1

JG07 Biconical Jug, no illustration

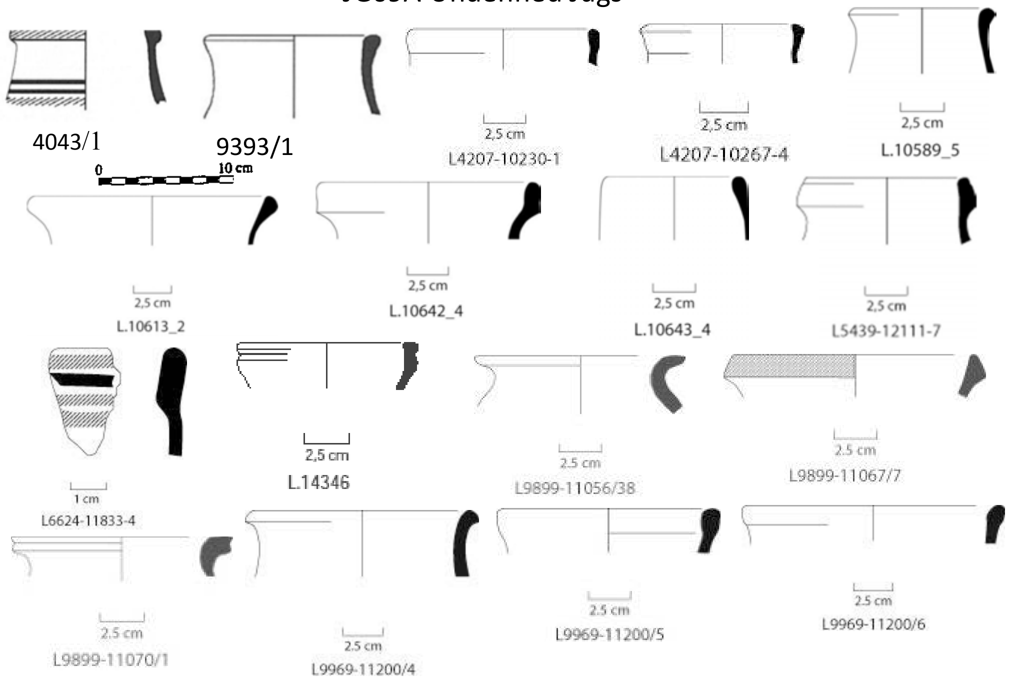
JG08 Small Jug-Bottle

JG09A Undefined Jugs (rim shards)

Reg.no	Locus	phase	rim Ø	Surface	Main temper	Second temper	color
4043/1	1213	E		painted stripes			
9393/1	6140	R		-			
10230/1	4207	U2	80	red 2.5YR 4/4 stripe on rim	chalk, much, coarse	basalt, much, medium	surfaces: 7.5YR 8/4; core: 7.5YR 5/4
10267/4	4207	U2	70	-	sand, little, small	organic, very little, small	surfaces: 5YR 5/6; core: 7.5YR 3/2
10589/5	4301	U3B	80	-	sand, medium, small	-	out:7.5YR 7/3; in: 7.5YR 7/4; core: 10YR 7/3
10613/2	4301	U3B	100	-	quartz, medium, coarse	basalt, little, medium	out: 5YR 6/6; in: 7.5YR 7/4; core: 7.5YR 5/3
10642/4	4312	U3B	130	-	basalt, much, coarse	chalk, little, coarse	surfaces: 5YR 6/4; core: 5YR 5/6
10643/4	4312	U3B	90	-	chalk, little, coarse	basalt, little, coarse	out: 7.5YR 7/4; in: 7.5YR 7/2; core: 7.5YR 6/3
12111/7	5439	W2	80	-	basalt, medium, medium	chalk, little, coarse	out: 7.5YR 7/4; in: 2.5YR 7/4; core: 7.5YR 6/3
11833/4	6624	R	80	red 10R 4/4 and gray 7.5Y stripes	basalt, much, small	chalk, little, coarse	out: 5YR 7/6; in: 5YR 7/4
14346/1	1835	S			sand, med., m	-	out: 2.5Y 7/2; in: 2.5Y 8/3; core: 2.5Y 6/1
11056/38	9899	R	70		sand, med. m	organic, little, s	out: 7.5YR 3/2; in: 7.5YR 5/2; core: 7.5YR N4
11067/7	9899	R	80		sand, little	organic, med. s	surfaces: 5YR 7/4; core: 5YR 5/1
11070/1	9899	R	130		sand, little, small	chalk, little, s	surfaces: 2.5YR 6/6; core: 2.5YR gray N5
11200/4	9969	R V	120		basalt, little, c.	chalk, much, m	out: 7.5YR 7/4; in: 7.5YR 8/4; core: 10YR 7/3
11200/5	9969	R V	80		basalt, med. m	chalk, med. m	out: 10YR 8/3; in& core: 10YR 7/3
11200/6	9969	R V	120		basalt, much, s	chalk, little, c.	out: 5YR 7/4; in: 5YR 7/3; core: 7.5YR 6/4

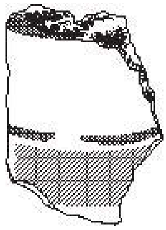
Appendix 5H Jugs

JG09A Undefined Jugs



JG09B Undefined Jugs (Decorated Body Shards)						
Reg.no	Locus	area	Surface	Main temper	Second temper	color
11027/3	9878	R	red 2.5YR 5/6 and gray 7.5YR N4 stripes	organic, medium, small	chalk, little, small	surfaces: 7.5YR pink 8/4; core: 5Y gray 6/1
11017/1	9886	R	pale slip 10YR 8/3, red 7.5YR 4/4 stripes	basalt, very much, medium	chalk, little, medium	out: 10YR 8/3; in: 7.5YR 7/4; core: 10YR 7/3
11059/5	9902	R	red 2.5YR 4/4 and gray 5YR 4/1 pattern	basalt, very much, medium	organic, medium, med	out: 5YR 7/4; in: 5YR 6/4; core: 5YR 5/6
11062/33	9902	R	red 2.5YR 3/2 decoration	organic, medium, med	chalk, medium, coarse	out: 5YR 7/6; in: 5YR 6/4
11075/5	9904	R				
11105/5	9922	R	pale 5Y 7/2 slip, brown decoration	sand, little, small	organic, medium, med	out: 5Y light gray 7/2; in: 10YR 8/4; core: 5YR 5/2
10209/1	4200	U0	pale (7.5YR 8/4) slip; red (10R 4/2) and dark gray (2.5Y N5) stripes	basalt, much, medium	chalk, medium, coarse	out: 7.5YR 8/4; in: 7.5YR 7/6; core: 7.5YR 6/4
11870/2	6631	R	brown 5YR 4/2 decoration	basalt, little, s	quartz, little, s	out: 5YR 6/6; in: 10YR 6/3; core: 7.5YR 4/1
14346/4	1835	S	red 10R 4/4 decoration	basalt, little, medium	chalk, very little, small	out: 10YR very pale brown 7/4; in: 10YR 7/3
12020/1	5400	W0	brown 2.5YR 3/4 decoration	quartz, med. s	-	out: 7.5YR pink 7/4; in: 10YR grayish brown 5/2; core: N gray 5/0
12015/2	5403	W0	red 5YR 5/4 decoration	basalt, much, s	chalk, little, c	surfaces: 10YR 7/4; core: 5Y gray 5/1
12021/3	5404	W2	red (10R 5/3) and dark gray (5YR 4/1) stripes	basalt, much, small	chalk, little, coarse	out: 10YR 8/4; in: 5YR 7/4; core: 5YR 6/4
12430/3	3968	N	red 10R 4/4 and gray 5YR 3/1 decoration	basalt, much, small	chalk, little, coarse	surfaces: 2.5YR light red 6/6; core: 10YR gray 5/1

JG09B Undefined Jugs, Decorated Body Shards



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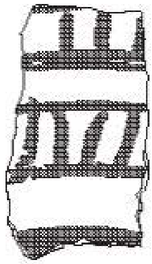

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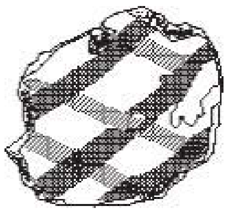
L9886-11017/1



1 cm

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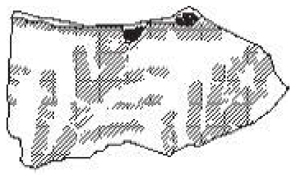

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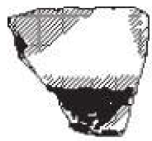
L9902-11062/33



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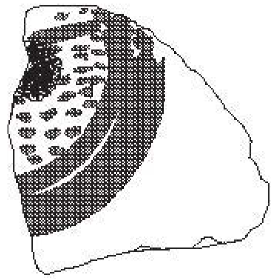

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L9922-11105/5

1 cm

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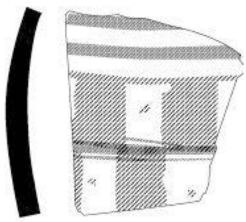

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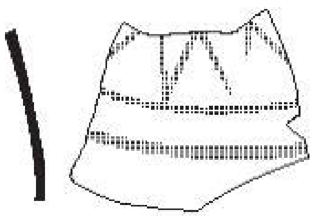

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L.14346

1 cm

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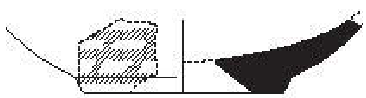

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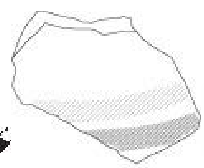
L 5403-12015/2

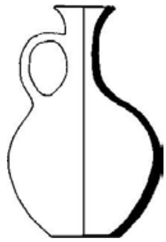


1 cm

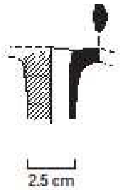
L5404-12021/3

12430/3

JL01A Rounded Juglets with High Neck and Flat Base



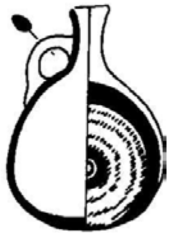
4273/1



L4205-10222/12

JL01B Rounded Juglets with High Neck and Round Base

6602/1



7364/1

L4301-10699-1

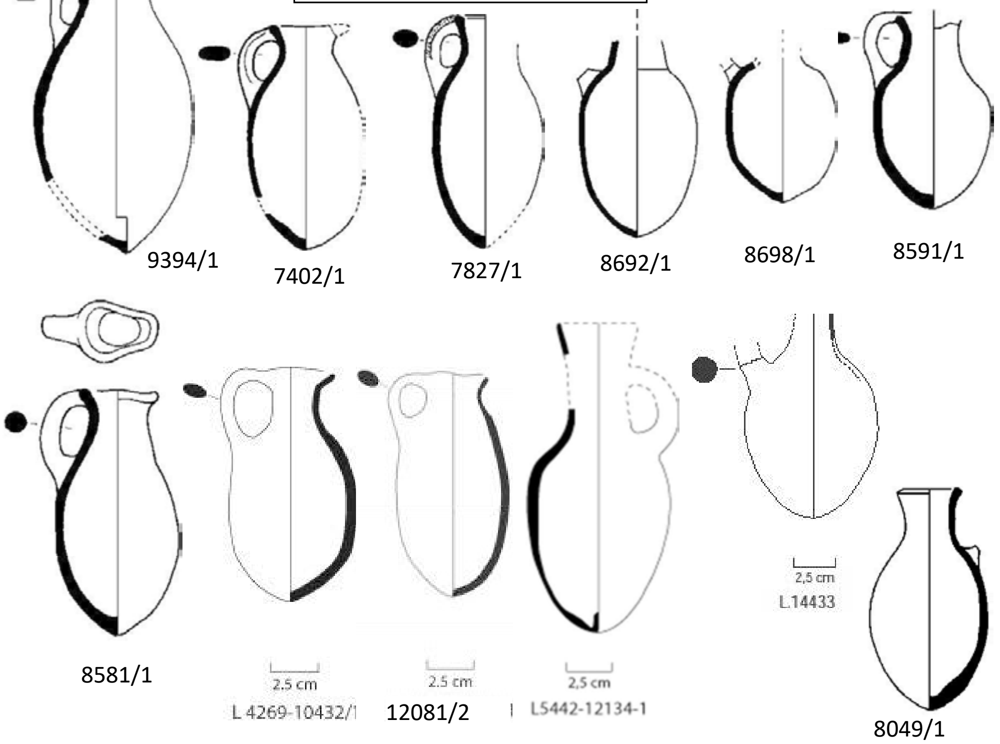
14128/12

L.4301
10800_1

Reg.no	Locus	Phase Stratum	Pres	Width	Height	rim Ø	Surface	Main temper/ Small grits	Second temper/ Big grits	color
JL01A Rounded Juglets with High Neck and Flat Base										
4273/1	3127	H /VI fill	3	93	135	25		very many small black	-	surface: 10YR gray 6/1; core: 5YR light gray 7/1
10222/12	4205	U0	1	-	-	42	red slip (?)	chalk, little, coarse	sand, medium, medium	out: 2.5YR 5/6; core & in: 2.5YR 6/6
JL01B Rounded Juglets with High Neck and Round Base										
6602/1	3586	N1 / V	3	95	150	20	dark gray (2.5YR N3) circles	white small grits	few big white grits	surface:5YR reddish yellow 6/8; core: 10YR gray 5/1
7364/1	4126	J1 / V	3	105	145	20	hand-burnish, dark brown 7.5YR 3/2 circles	many white, black small grits	many white big grits	5YR reddish yellow 6/8
10699/1	4301	U3B	3	100	150	20	-	quartz, little, coarse	basalt, little, coarse	out: 5YR 6/6; in 5YR 5/4; core: 2.5YR 5/4
10800/1	4301	U3B	0	90	-	ca. 20	-	red grits, medium, medium	quartz, much, small	out: 2.5YR 6/8; in & core: 7.5YR 7/6
14128/12	4367	U4	1	-	-	25	burnish, red 2.5YR 5/6 slip	chalk, little, medium	sand, little, small	surfaces: 7.5YR 7/3; core: 7.5YR 6/3

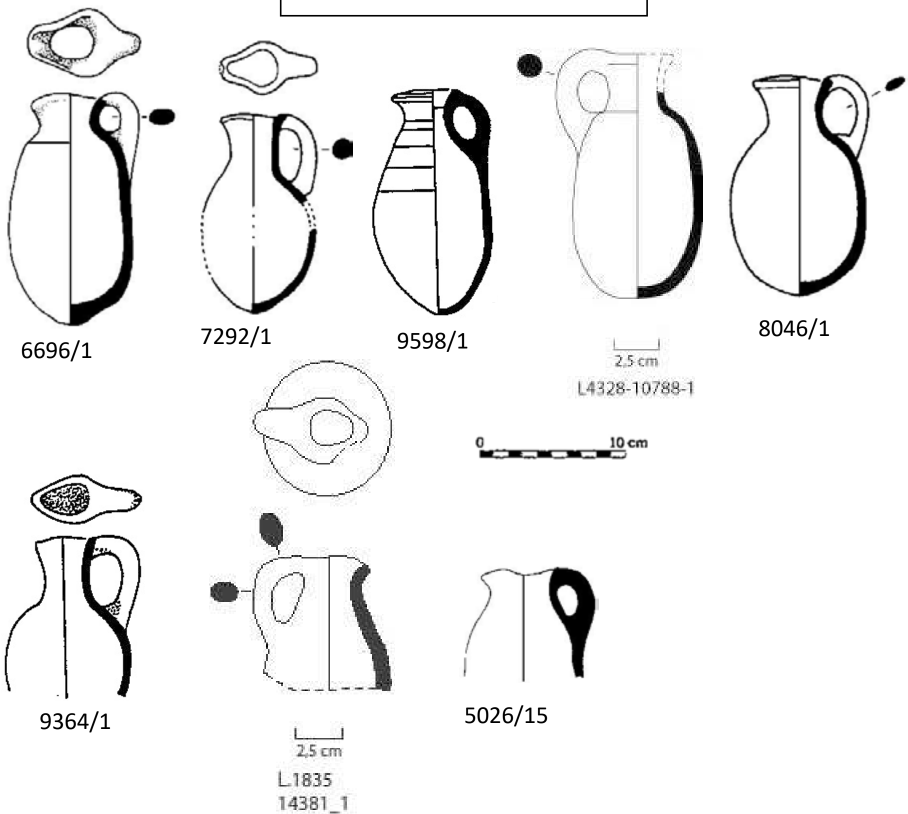
Appendix 5I Juglets

JL02A Ovoid Dipper Juglets



JL02A Ovoid Dipper Juglets										
Reg.no	Locus	Phase	Pres	Width	Height	rim Ø	remarks	Main temper/ Small grits	Second temper / Big grits	color
9394/1	6140	R VII	2-3	125	220	50		Many black, white	White, few grey	surface:5YR reddish yellow 6/6; core: 7.5YR light brown 6/3
7827/1	5309	K /V	2	70	150	45		very many black, white	few white	surface: 10YR very pale brown 7/4; core: 10YR gray 5/1
8692/1	5237	K2 / V	2	65	>130	-	-	many black, white, gray	white, brown, gray	surface:5YR reddish yellow 6/6; core: 7.5YR light brown 6/4
8698/1	5237	K2/V	2	65	>100	-	-	Many brown, quartz; white, gray	Many white, gray	surface & core: 5YR reddish yellow 6/6
8581/1	5126	K2/V	3	70	150	25–40		Many black, grey	White	5YR reddish yellow 6/6
8591/1	5126	K2/V	2-3	75	125	35		Very many black, white, br	Many white, grey, brown	10YR very pale brown 8/4
7402/1	4088	J2 / VI	2-3	88	165	50	trefoil mouth	many white, gray, black	few white, gray big grits	surface: 10YR very pale brown 8/4; core: 10YR gray 5/1
10432/1	4269	U0/3	3	68	130	8–30		Red grits, medium, med	Chalk, little, medium	surfaces: 7.5YR 7/6; core: 5YR 7/6
12081/2	5423	W2	3	63	120	ca 25		Basalt, medium, medium	Chalk, very little, medium	out: 10YR light yellowish brown 6/4; in: 10YR pale brown 6/3
12134/1	5442	W4	3	81		40		Basalt, medium, medium	Organic, medium, m	out: 2.5YR 6/6; in: 7.5YR 6/4; core: 2.5Y 5/1
14433/1	1849	S	2	70	>125	-		Basalt, medium, medium	Chalk, little, medium	out: 2.5YR light red 6/8; in: 7.5YR 7/6; core: 2.5Y light brownish gray 6/2
8049/1	5022	K1/IV	3	125	145	35–40		Many brown, black, white	Few white, gray	surface: 10YR very pale brown 8/4; core: 10YR light gray 7/2

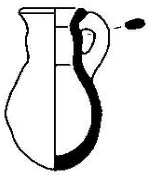
JL02B Globular Dipper Juglets



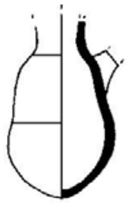
Reg.no	Locus	Area, Phase	Pres	Width	Height	rim Ø	remarks	Main temper/ Small grits	Second temper / Big grits	color
JL02B Globular Dipper Juglets										
6696/1	3599	N1 / V	3	80	150	20–45		white, gray small grits	very big gray, big white grits	surface: 2.5YR red 5/8; core: 5YR reddish yellow 6/6
7292/1	4095	J1 / V	3	60	140	40		many white, black small grit	brown, white big grits	surface: 5YR reddish yellow 6/6; core: 7.5YR pink 7/4
9598/1	6178	R / V	3	80	150	40		many gray, few red, white small	very few white big grits	surface & core: 10YR yellow 8/6
10788/1	4328	U3B	3	72	137	30		Red grits, little, medium	basalt, very little, small	out: 2.5YR red 5/8; in: 5YR yellowish red 5/8
8046/1	5020	K1 / IV	3	75	120	x–35		many black, white, small gr	few white big grits	surface: 2.5YR light red 6/8; core: 7.5YR pink 7/4
JL02A–B Dipper Juglets, Globular or Ovoid										
9364/1	6133	R / V	2-3					many white small grits	-	surface: 7.5YR pink 7/4; core: 10YR gray 5/1
14381/1	1835	S	2	65		ca.30		basalt, medium, medium	chalk, little, medium	surfaces & core: 5YR reddish yellow 6/6
5026/15	2014	G	2			**x–40**		many black, gray, small	many white big grits	surface & core: 7.5YR reddish yellow 7/6

Appendix 5I Juglets

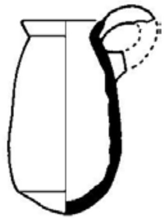
JL02C Dipper Juglets with Sack Shaped Body



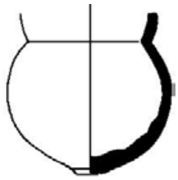
4154/1



8592/1

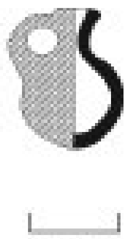


8512/3



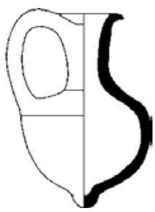
8512/2

JL03 Rounded Black Juglet



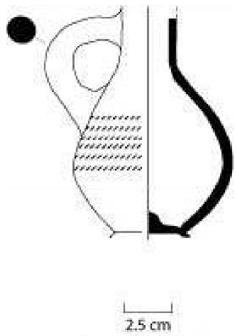
5 cm

10042/1



4272/1

JL04 Ring Based Juglet

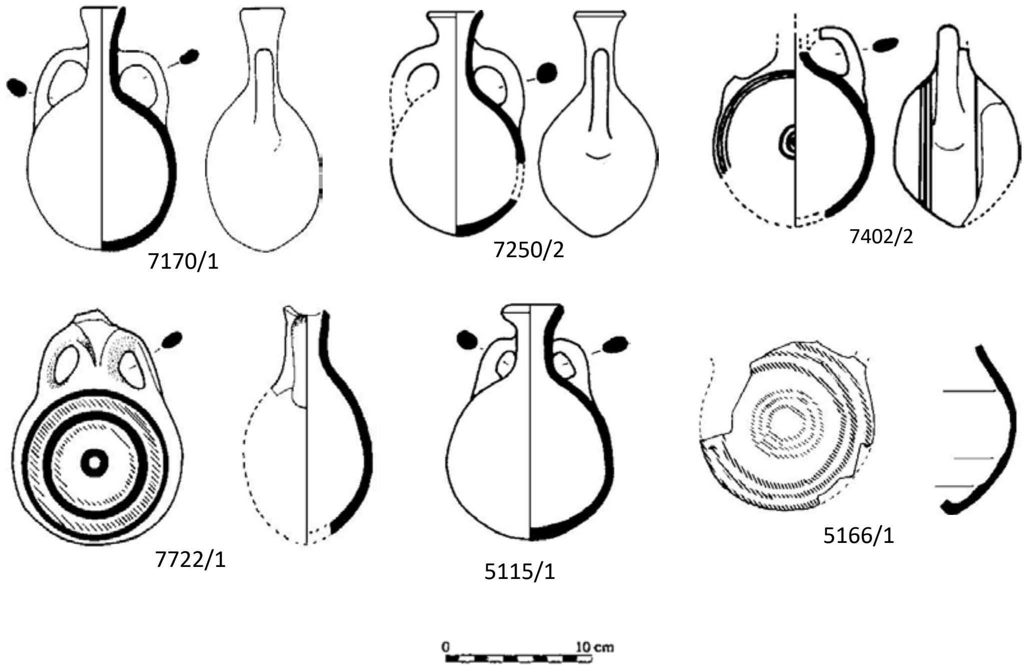


L5402-12022/1

10538/4

Reg.no	Locus	Area, Phase	Pres	Width	Height	rim Ø	remarks	Small grits	Big grits	color
JL02C Dipper Juglets with Sack Shaped Body										
4154/1	1250	E	3							
8592/1	5126	K2/V	2	65	125	-		many black, white, gray	many white, gray	surface: 5YR reddish yellow 7/6; core: 10YR light brownish gray 6/2
8512/3	5100	K2/V	3	65	110	40		many gray, few white	few white	surface: 5YR reddish yellow 7/6; core: 10YR light brownish gray 6/2
8512/2	5100	K2/V	2	95	>110	-		gray	very big gray, white	10YR very pale brown 7/4
JL03 Rounded Black Juglet										
10042/1	9002	T1	3	56	69	21	burnish, black slip	-	-	out: 10YR black 2/1; in: 2.5Y dark gray N4
4272/1	3116	H0	3	ca. 40	ca. 60	ca. 20	burnish, dark slip	very many black	very few gray	surface & core: 10YR dark grayish brown 4/2; slip: 10YR dark brown 3/3
JL04 Ring Based Juglet										
12022/1	5402	W0	2	84	>130	>30	red 2.5YR 4/4 stripes	basalt, medium, small	sand, little, medium	surfaces: 5YR reddish yellow 6/6
10538/4	4285	U3B	0	-	-	>25	red 10R 4/4 and gray 10YR 3/1 stripes	-	-	out: 5YR 6/6; in: 7.5YR pink 7/4; core: 10YR light yellowish brown6/4

FL01A Lentoid Flasks with Simple Rim

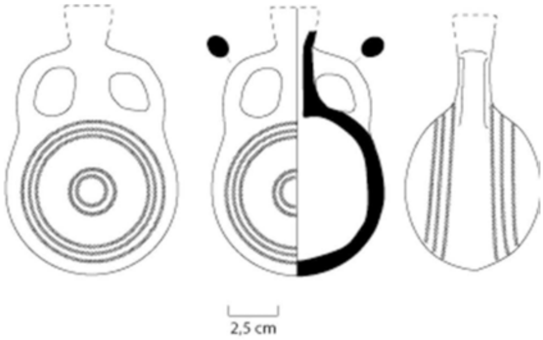


FL01A Lentoid Flasks with Simple Rim

Reg.no	Locus	Area, Phase	Width	section	Height	rim Ø	remarks	Small grits	Big grits	color
7170/1	4056	J2 / VI	105	80	150	30	-	few red & white	few white	surface: 5YR reddish yellow 6/8; core: 10YR gray 6/1
7250/2	4088	J2 / VI	95	85	150	40	-	many white & gray	few white	surface: 2.5YR light red 6/8; core: 10YR dark grayish brown 4/2
7402/2	4088	J2 / VI	100	80	>120	-	hand-burnish, dark gray (5YR 4/1) circles	many gray & white	few white	surface: 5YR reddish yellow 6/6; core: 10YR light brownish gray 6/2
7722/1	5283 K	K3/ VI	115	85	>150	-	dark red (10R 3/6) and dark gray (7.5YR N3) circles	very many black, few white	many white	surface: 10YR very pale brown 8/4; core: 10YR very pale brown 7/3
5115/1	2047	G2 / V	90	?	125	35	-	many black	white	out: 2.5YR light red 6/6; in: 10YR very pale brown 8/4; core: 10YR very pale brown 7/3
5166/1	2050	G2 / V	125	9	-	-	pale (10YR 8/4) slip, brown (7.5YR 5/4) circles	many brown, red, black & white	few white	surface: 10YR very pale brown 7/4; core: 10YR yellow 7/6
6602/2	3586	N1 / V	80	65	12	30	pale (10YR 8/4) slip	-	gray & red	surface: 7.5YR reddish yellow 7/6; core: 10YR very pale brown 7/3
9064/1	6011	M1	90	70	125	-	brown circles	many black, few white	-	surface: 5YR reddish yellow 6/8; core: 10YR dark gray 4/1

Appendix 5J Flasks

FL01A Lentoid Flasks with Simple Rim



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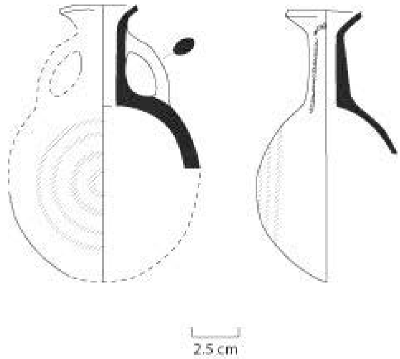

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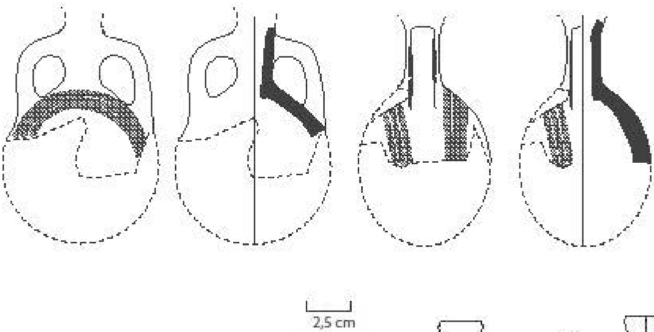
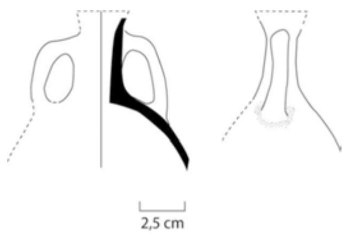


14279_1



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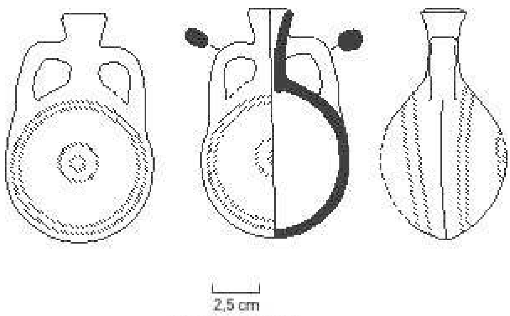
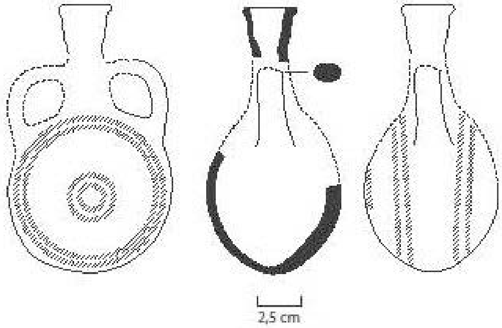


L4342-10834-1

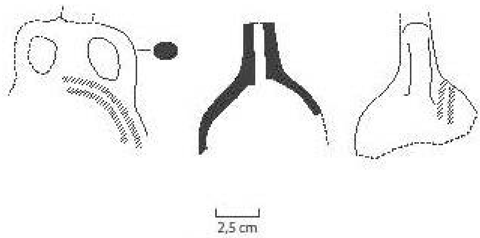
FL01A Lentoid Flasks with Simple Rim (cont.)

Reg.no	Locus	Area, Phase	Width	section	height	rim Ø	remarks	Main temper	second temper	color
12355/1	3944	N V	90	70	130		white 2.5Y 8/1 slip, black 10YR 3/1 circles	basalt, much, small	chalk, very little, medium	out: 2.5YR light red 7/6; core: 7.5YR light brown 6/3
11200/1	9969	R / V	102	80	150	44	red 2.5YR 4/4 circles	basalt, much, small	chalk, little, coarse	out: 10YR 8/3; in: 10YR yellow 8/6; core: 10YR brown 5/3
14279/1	1768	S	85				white slip 5YR 8/3, dark brown 5YR 3/2 circles	chalk, very little, small	quartz, very little, small	out: 5YR pink 7/4; in & core: 5YR black 2.5/1
14342/1	1827	S	10					basalt, med., medium	chalk, little, medium	surface: 7.5YR pink 7/4
10834/1	4342	U3B	80	80	121	12,3	red 2.5YR 5/6 circles	basalt, much, small	chalk, little, coarse	out: 7.5YR pink 7/4; in: 7.5YR gray 5/1

FL01A Lentoid Flasks with Simple Rim



L.4328
10787_4



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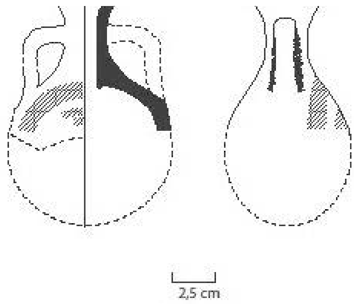
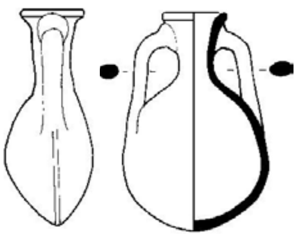
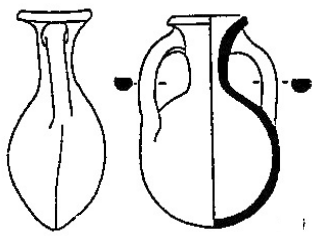


12131 1

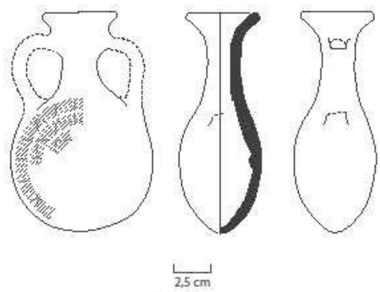
FL01B Extremely Lenticular Flasks



8593/1



9049/1



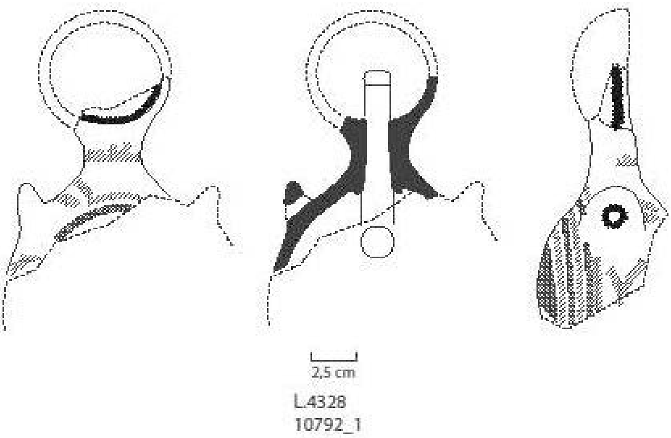
L.4328
10793_1

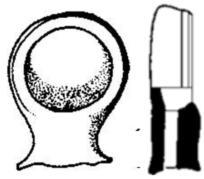
FL01A Lentoid Flasks with Simple Rim (cont.)

Reg.no	Locus	Area, Phase	Width	section	Height	rim Ø	remarks	Main temper	second temper	color
10787/4	4328	U3B	92,5	75	150	22	red (10R 4/6) circles	basalt, much, small	chalk, little, coarse	out: 2.5YR red 6/6; in: 7.5YR reddish gray 5/2; core: 7.5YR brown 5/3
10799/1	4328	U3B					red circles	basalt, much, small	quartz, little, medium	out: 2.5YR light red 6/6; in: 7.5YR dark brown 4/2; core: 10YR dark gray 4/1
12137/1	5437	W2	90	75	130	33	burnish, red 10R 6/6 circles	chalk, little, coarse	basalt, little, small	out: 5YR pink 7/4; in: 7.5YR light gray 7/1; core: 7.5YR gray 5/1
FL01B Extremely Lenticular Flasks										
8593/1	5126	K2 V	100	60	150	40	-	few gray & white	few red & white	7.5YR reddish yellow 7/6
9049/1	6011	M1	85	60	135	50	-	many black	few white & brown	7.5YR reddish yellow 7/6
10793/1	4328	U3B	97	55	150	44	red slip, red circles	basalt, med., small	quartz, little, medium	out: 5YR 6/6; in: 7.5YR 7/6; core: 7.5YR 6/4

Appendix 5J Flasks

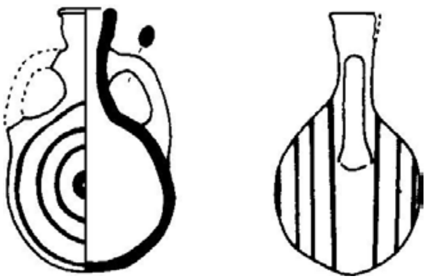
FL01C Lentoid Flasks with Spoon-Cup



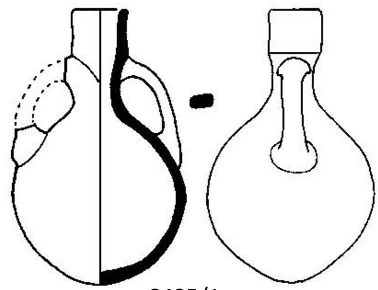


7296/1

FL02A Small Globular Flasks



7297/1



8495/1

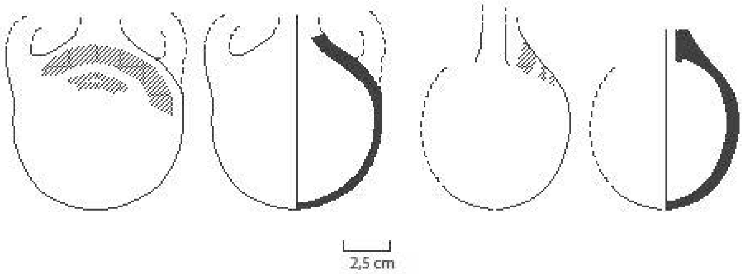
FL01C Lentoid Flasks with Spoon-Cup

Reg.no	Locus	Area, Phase	Width	height	rim Ø	remarks	Main temper	second temper	color
10792/1	4328	U3B	130	>160	60	red 10R 5/8 and dark gray 7.5YR 4/1 circles	basalt, much, medium	chalk, little, coarse	out: 2.5YR 6/8; in: 10YR 5/3; core: 10YR 5/2
7296/1	4095	J1 V			70	-	many black small grits	few white small grits	7.5YR reddish yellow 7/6

FL02A Small Globular Flasks

Reg.no	Locus	Area, Phase	Width	section	Height	rim Ø	remarks	small grits	big grits	color
7297/1	4095	J1 V	90	78	135	30	yellow (10YR 7/6) slip, red (2.5YR 5/6) and dark brown (10YR 3/2) circles	many gray	few white, red, grey	surface: 10YR very pale brown 7/4; core: 10YR very pale brown 7/3
8495/1	5100	K2 V	100	95	155	30	traces of circles, blackened	many gray, few black, white	few white	7.5YR reddish yellow 7/6

FL02A Small Globular Flasks



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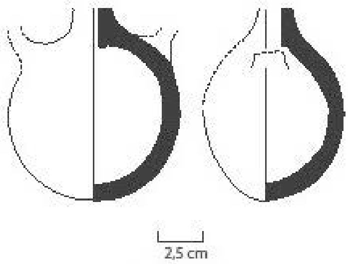

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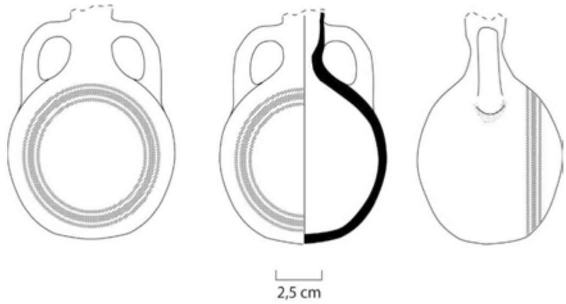
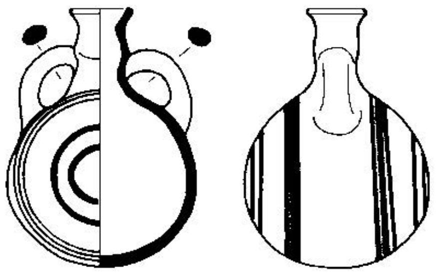


L.14336_1



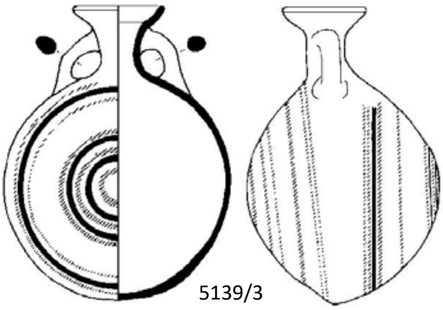
8050/1 (IV)

FL02A Small Globular Flasks (cont.)

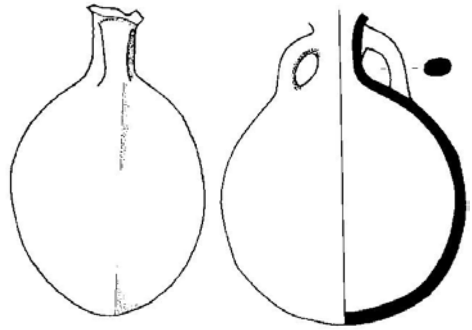
Reg.no	Locus	Area, Phase	Width	section	Height	rim Ø	remarks	main temper	second temper	color
14277/1	1779	S	91	80			black 10B 2.5/1 circles	basalt, medium, small	chalk, very little, med.	out: 10YR yellowish brown 5/6; in & core: 10YR dark gray 4/1
14279/2	1779	S	94	80			traces of pale slip, worn surface	organic, little, medium	chalk, very little, coarse	out: 10YR very pale brown 8/4; in: 7.5YR dark gray 3/1; core: 10YR 7/4
14336/1	1786	S	91.4	83	124	12.5	red slip, red (10R 4/4) and brown (7.5YR 3/2) circles	basalt, little, small	-	out: 5YR pink 7/4; slip: 10R 5/6
8050/1	5022	K1 IV	100	100	145	35	red (10R 4/4) and dark gray (5YR 4/1) circles	small brown, white and quartz grits	few big white grits	surface: 7.5YR strong brown 5/6; core: 10YR grayish brown 5/2

Appendix 5J Flasks

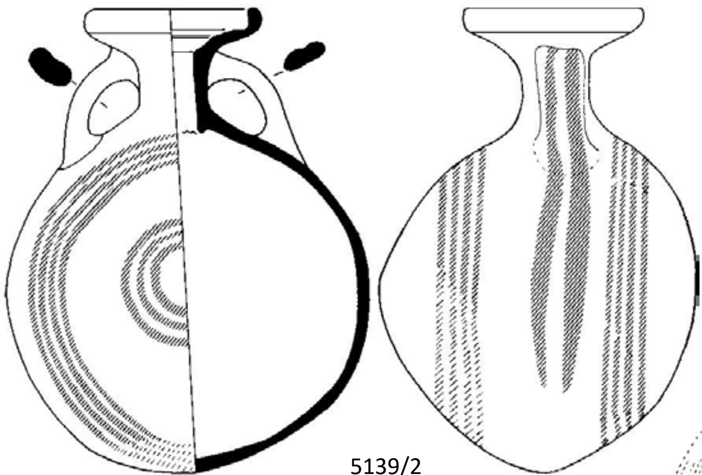
FL02B Large Globular Flasks



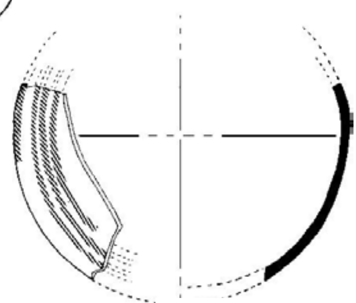
5139/3



7844/1



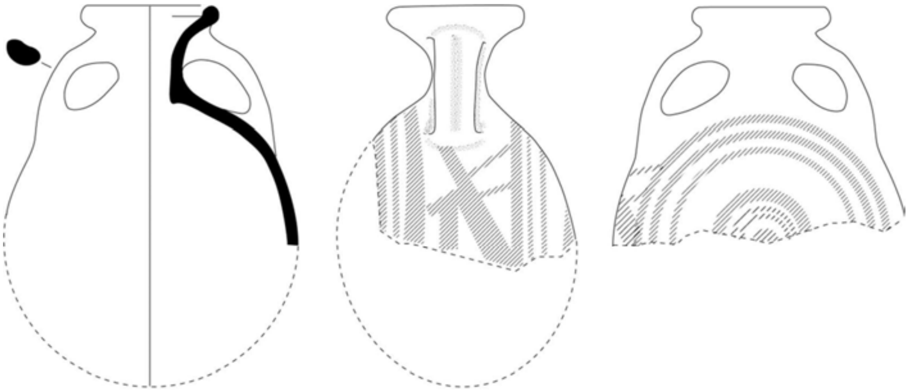
5139/2



5172/1

FL02B Large Globular Flasks										
Reg.no	Locus	Area, Phase	Width (mm)	section	Height	rim Ø	remarks	small grits	big grits	color
5139/3	2050	G2 V	190	162	250	75	pale (7.5YR 8/4) slip, red (5YR 5/3) and brown (7.5YR 5/2) circles	many dark and white	few white and dark	surface: 2.5YR light red 6/8; core: 7.5YR reddish yellow 7/6
5139/2	2050	G2 V	270	234	340	125	red (2.5YR red 6/6) circles	few gray and white	few white, brown, gray	surface: 2Y pale yellow 8/4; core: 7.5YR pink 7/4
5172/1	2050	G2 V	250				pale slip (10YR 8/4), red (10R 5/8) circles	many black and white, few quartz	-	2.5YR red 5/8
7844/1	5309	K2 V	193	155	250	-		many black and white	-	7.5YR reddish yellow 7/6

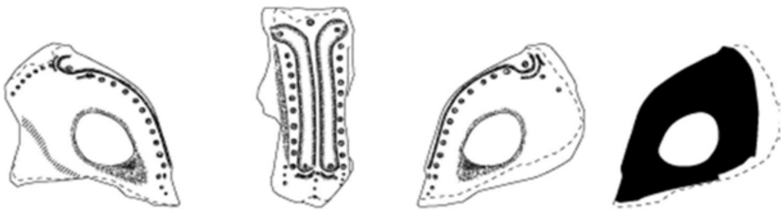
FL02B Large Globular Flasks (cont.)



2,5 cm

L.14430

FL03 Flask with punctured decoration



2,5 cm

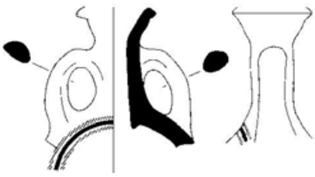
L1722-12758-1

Handle 12749/1

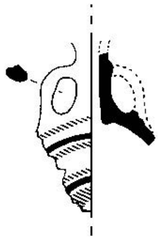
Reg.no	Locus	Area, Phase	Width (mm)	section	Height	rim Ø	remarks	main temper	second temper	color
FL02B Large Globular Flasks (cont.)										
14430/1	1846	S	160	135	215	75	white slip (2.5Y 8/3), red (2.5YR 4/6) circles and stripes	basalt, little, medium	quartz, very little, small	out: 2.5YR red 5/6; in: 5YR dark gray 4/1
FL03 Flask with punctured decoration										
12758/1	1722	S	-	-	-	-	punctuated and incised decoration	basalt, much, medium	chalk, medium, coarse	out: 5YR pink 7/4; in: 7.5YR light brown 6/3; core: 10YR brown 5/3
12749/1	1728	S	-	-	-	-	punctuations	basalt, medium, small	quartz, little, coarse	out: 7.5YR pink 7/4; core: 10YR grayish brown 5/2

Appendix 5J Flasks

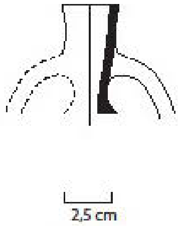
FL01-2A Small Flasks with unknown body form



5134/1

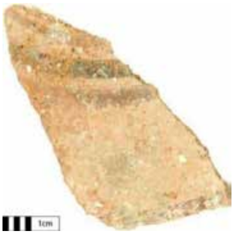


5129/1



14279_3

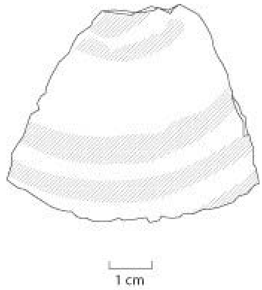
10765/2



10424/7

10290/2

11036/2



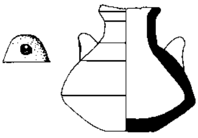
L9892-11051/1

11056/18

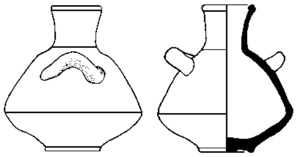
14395/1

FL01-2A							
Reg.no	Locus	Area, Phase	rim Ø	remarks	small grits/ main temper	big grits/ second temper	color
5134/1	2058	G3 VI	35	reddish brown (5YR 5/4) and black circles	brown, dark gray, white	white	surface: 10YR very pale brown 7/4; core: 10YR gray 5/1
5129/1	2058	G3 VI	-	dusky red (10R 3/3) and dark reddish gray (10R 4/1) circles	many dark, few white	few white	surface: 5YR reddish yellow 6/6; core: 7.5YR pinkish gray 6/2
14279/3	1779	S		traces of fire, also body shards joining	basalt, very little, small	chalk, little, medium	out: 10YR very pale brown 8/4; in: 7.5YR very dark gray 3/1; core 10YR 7/4
10765/2	4328	U3B	30		basalt, much, small	chalk, little, coarse	surface:7.5YR pink 7/4; core: 7.5YR light brown 6/4
10424/7	4277	U3B		red 10R 4/4 and gray 10YR 3/1 circles	basalt, medium, small	chalk, little, medium	out: 2.5YR 6/6; in: 10YR 5/3; core: 7.5YR pink 7/4
10290/2	4230	U2		red (10R 4/4) circles	basalt, medium, small	chalk, little, medium	surface:7.5YR pink 7/4; in: 7.5YR 6/6; core: 5YR reddish brown 5/3
11056/18		R V		brown 7.5YR 4/2 circles	few small gray grits	organic, little, small	out: 7.5YR brown 5/2; in: 10YR 7/4; core: 10YR light brownish gray 6/2
11036/2	9888	R0		red 2.5YR 6/6 and brown 7.5YR 4/2 circles	basalt, very much, medium	chalk, little, medium	out: 7.5YR reddish yellow 7/6; in: 10YR 7/4; core: 10YR pale brown 6/3
11051/1	9892	R0		red 2.5YR 4/8 and brown 5YR 4/3 circles	basalt, very much, medium	chalk, little, medium	out: 7.5YR pink 7/4; in: 10YR pale brown 6/3; core: 10YR brown 5/3
14395/1	1832	S V		red 2.5YR 4/8 circles	sand, little, medium	-	out: 5YR 6/4; in: 10YR 6/4; core: 5YR 4/6

PX01 Piriform Pyxis



6808/1



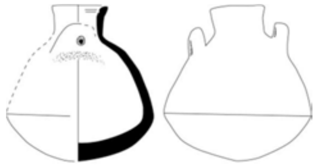
8575/1

9652/1

9628/1

2,5 cm

12825_x



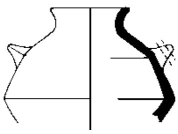
2,5 cm

L.1849

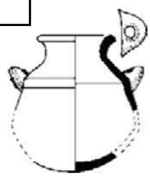
14445_1

10124/1

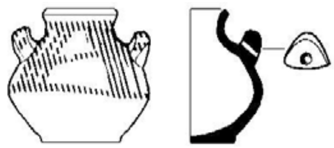
PX02A Squat Biconical Pyxis



4832/1



7698/1

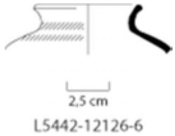


8338/1

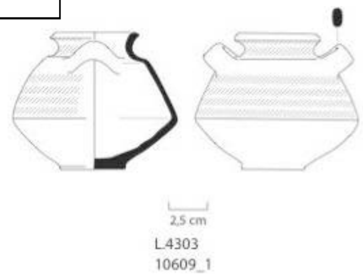
PX01 Piriform Pyxis										
Reg.no	Locus	Area, Phase	width mm	height mm	rim Ø	handle	remarks	Small grits/ main temper	Big grits/ second temper	color
6608/1	3656	N1/ V	105	100	40	knob		very many black	very few quartz	surface: 7.5YR reddish yellow 7/6
8575/1	5126	K2/V	110	115	35	ledge		very few brown	very few gray, white	surface: 7.5YR reddish yellow 7/8
9652/1	4046	J1/V	105	90	35	knob	_no_ slip	many grey, few white and red	few white	surface 7.5YR reddish yellow 7/6; core: 10YR very pale brown 8/4
9628/1	4126	J1/V	115	120	35	knob	reddish brown (5YR6/4) and reddish gray (5YR 4/2) stripes	many black	-	surface: 10YR yellow 7/6; core: 10YR light gray 7/1
12825/2	1721	S	95	-	-	knob		Basalt, medium, coarse	Chalk, very little, medium	out: 7.5YR reddish yellow 6/6; in: 10YR brownish yellow 6/8; core: 10YR 5/4
14445/1	1849	S	90	110	-	knob		Basalt, little, medium	Chalk, little, medium	surfaces: 7.5YR pink 7/4; core: 7.5YR pink 7/3
10124/1	9012	T / V	100	94	-	knob		Basalt, medium, Small	Chalk, little, medium	out: 2.5YR 5/6; in: 5YR black 3/1; core: 5YR 4/1
PX02A Squat Biconical Pyxis										
4832/1	1809	F3-VI	115	95	45	knob		many black, white and gray	many big white grits	surface: 10YR pale brown 6/3; core: 10YR
7698/1	5277 K	K2/V	100	95	45	knob		many black and white	white	surface & core:7.5YR reddish yellow 7/6
8338/1	5079	K2/V	100	90	45	knob	red (10R 4/6) decoration	many gray, black, white	few white, gray	surface: 10YR very pale brown 8/4; core: 10YR 7/3

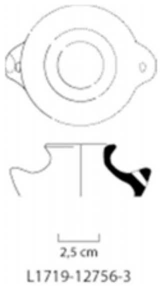
Appendix 5K Pyxides

PX02A Squat Biconical Pyxis

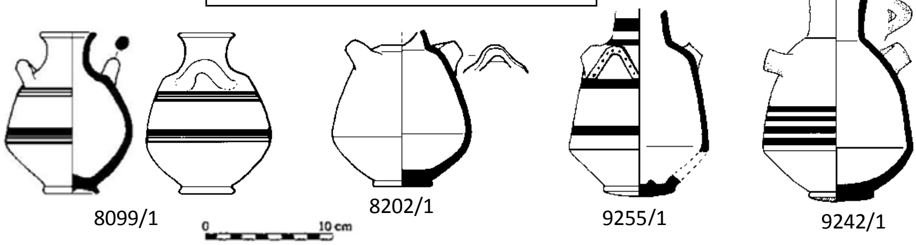


10620/2



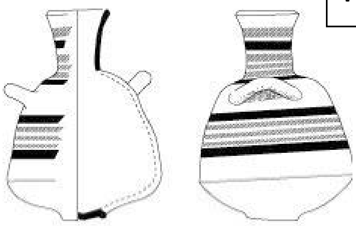


PX02B Tall Biconical Pyxis

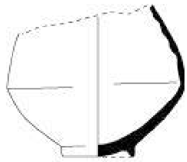


PX02A Squat Biconical Pyxis										
Reg.no	Locus	Area, Phase	width mm	height mm	rim Ø	handle	remarks	main temper	second temper	color
12116/6	5442	W4	-	-	50		red (10R 4/4) stripes	Basalt, medium, small	Chalk, little, coarse	out: 7.5YR pink 8/4; in: 7.5YR pink 7/4; core: 5YR reddish brown 5/3
10609/1	4303	U3A	109	90	49	ledge	red (10R 5/8) stripes	Basalt, little, small	quartz little, medium	out: 5YR reddish yellow 7/6; in: 7.5YR reddish yellow 8/6; core: 7.5YR light brown 6/4
10620/2	4301	U3B			29		red (10R 4/4) stripes	Basalt, little, small	quartz little, coarse	out: 5YR pink 8/4; in: 7.5YR pink 7/3; core: 7.5YR light brown 6/4
10357/1	4256	U3B	85	88	-	knob	worn surface	chalk, medium, coarse	basalt, much, coarse	out: 10YR very pale brown 7/4; in: 5Y gray 5/1; 5Y light gray 7/1
12756/3	1719				40	knob		basalt, much, small	chalk, little, medium	out: 5YR light reddish brown 6/4: in: 7.5YR pink 7/4; core: 7.5YR brown 5/4
PX02B Tall Biconical Pyxis								small grits	big grits	
8099/1	5027	K2/V	100	123	40	ledge	grayish brown (10YR 5/2) stripes	white, gray, few quartz	few big white	10YR brownish yellow 6/6
8202/1	5043	K2/V	105	120	-	ledge		many gray, few white and red	few black, gray, red and white	surface & core: 5YR reddish yellow 6/8
9255/1	6106	R /V	95	>125	-	ledge	black 5YR 3/1 decoration	few white and gray	few white	surface: 2.5YR red 5/8; core: 7.5YR brown 5/2
9242/1	6106	R /V	105	150	35	ledge	red (2.5YR 4/2) stripes	few gray and white	few white	surface: 5YR reddish yellow 7/8; core: 10YR gray 5/1

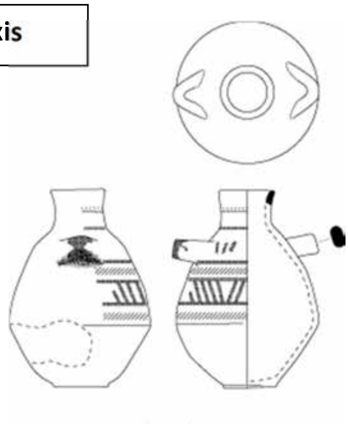
PX02B Tall Biconical Pyxis



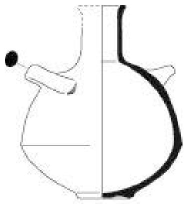
2,5 cm
L4328-10758-1



2,5 cm
L4255-10488-2

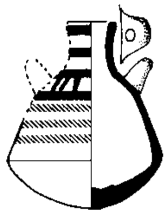


2,5 cm
L1729-12864-1



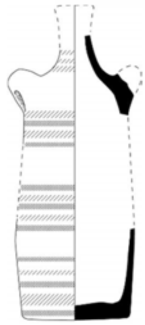
12025/1

2,5 cm



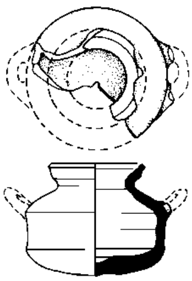
7630/1

PX04 Pyxis-Bottle

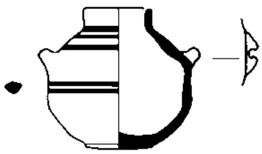


2,5 cm
L.1832
14345_1

PX03 Cylindrical Pyxis



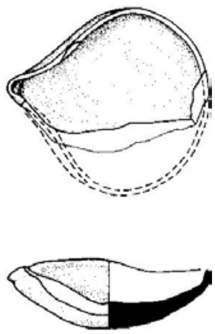
7012/1



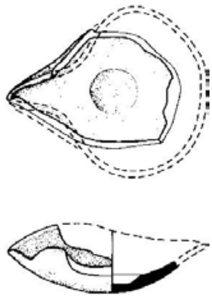
5169/1

PX02B Tall Biconical Pyxis										
Reg.no	Locus	Area, Phase	width mm	height mm	rim Ø	handle	remarks	main temper	second temper	color
10758/1	4328	U3B	90	125	35	ledge	red 10R 4/4 & brown 7.5YR 3/2 stripes	Basalt, much, small	Chalk, little, coarse	out: 5YR reddish yellow 6/6; in: 5YR light reddish brown 6/4
10488/2	4255	U0/ U3	107	-	-		red 10R 4/6 stripes	chalk, little, medium	organic, little, medium	out: 2.5YR light red 6/6; in: 5YR 6/6; core: 10YR grayish brown 5/2
12864/1	1729	S	90	127	27		red 10R 4/4 and black 10YR 3/1 decoration	-	-	out: 2.5YR light red
12025/1	5402	W0	98	128	30	ledge	red 10R 4/4 and brown 7.5YR 4/2 stripes	Basalt, much, small	Chalk, little, coarse	surfaces: 7.5YR pink 7/4; core: 7.5YR light brown 6/3
7630/1	5266 K	K IV	105	130	30	knob	yellowish red (5YR 4/6) stripes	small quartz and white grits	-	surface: 10YR very pale brown 7/4; core: 10YR yellowish brown 5/4
PX03 Cylindrical Pyxis								small grits	big grits	
7012/1	3725	S V	100	75	60	ledge		very many black, many white	many very big white	surface: 7.5YR pink 7/4: core: 10YR light gray 7/1
5169/1	2050	G2 V	95	93	40	knob	pale slip, red (10R 5/3) and dark gray (2.5YR N3) stripes	many black, white, gray	white, gray	surface: 5YR reddish yellow 6/8; core: 5YR reddish yellow 6/6; slip: 10YR very pale brown 8/4
PX04 Pyxis-Bottle								main temper	second t.	
14345/1	1832	S	90	110	-	knob	red and gray stripes	basalt, little, m.	-	
14401/1	1848	S				-	gray 5YR 4/2 decoration		sand, little	surfaces: 10YR 7/4; core: 10YR 5/1

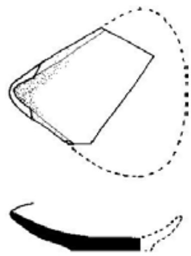
LP01 Simple Rimmed Lamps with Short, Wide Nozzle



4280/1

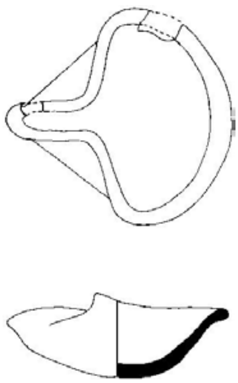


4280/2

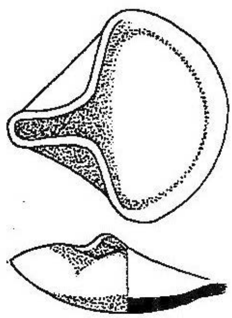


6143/11

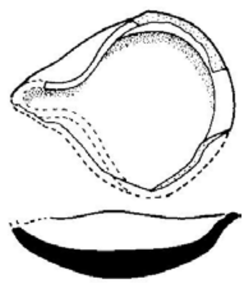
LP02A Broad Rimmed Lamps



6787/1



9279/1

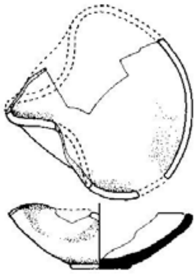


8452/1

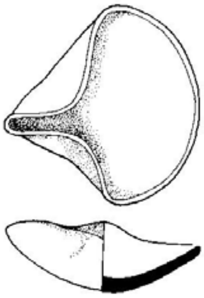
10508/1, not drawn

LP01 Simple Rimmed Lamps with Short, Wide Nozzle								
Reg.no	Locus	Area, Phase	width cm	length cm	remarks	Small grits	Big grits	color
4280/1	3127	H / fill of VI	>10	15	traces of fire at the nozzle	very many black	few quartz	surface & core: 7.5YR pink 8/4
4280/2	3127	H / fill of VI	-	>10	traces of fire at the nozzle	few black	-	surface & core: 5YR reddish yellow 7/6
6143/11	3047	H2 / fill of VI	-	-	traces of fire at the nozzle	few white and gray		surface: 10YR very pale brown 8/4; core: 7.5YR pink 7/4
LP02A Broad Rimmed Lamps						Small grits/ main temper	Big grits/ second temper	
6787/1	3656	N1 / V	17.5	17	traces of fire at the nozzle	very many black	few black and white	surface & core: 10YR very pale brown 8/4
9279/1	6106	R / V	15	14	sooted all over	many black, few white	-	surface: 5YR reddish yellow 7/6; core: 7.5YR pink 7/4
8452/1	5088	K2 / V	14	>10	traces of soot in bottom and in nozzle	many quartz, white	few gray, white	surface: 10R red 5/6; core: 10YR gray 5/1
10508/1	4276	U3B	14	-	joining rim shards	basalt, little, medium	chalk, little, medium	out: 2.5YR 5/6; in: 2.5YR 6/6; core: 7.5YR N4

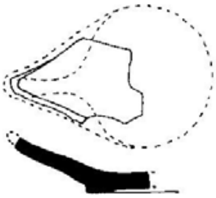
LP02B Simple Rimmed Lamps with Long, Narrow Nozzle



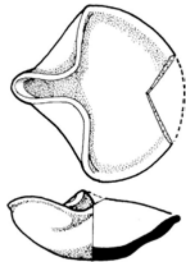
5153/1



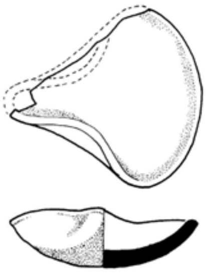
6701/2



6660/1

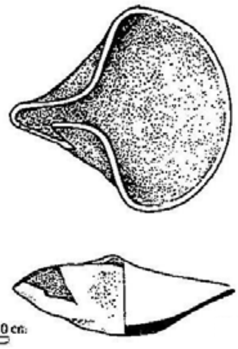


7247/11

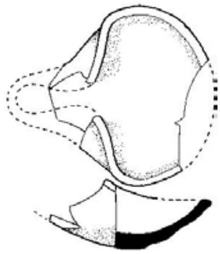


8212/1

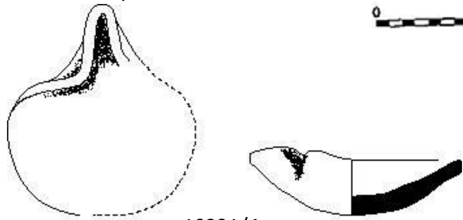
8191/1



9604/2



7666/1

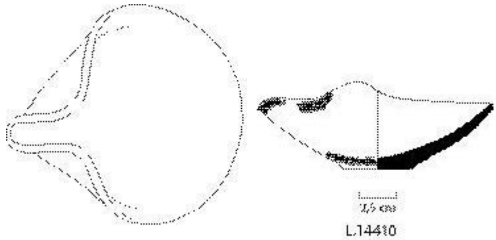


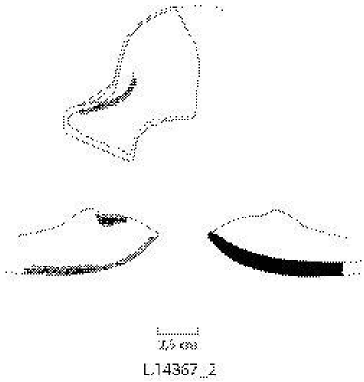
10231/4

2,5 cm

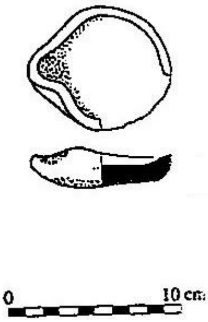
LP02B Simple Rimmed Lamps with Long, Narrow Nozzle								
Reg.no	Locus	Area, Phase	width cm	length cm	remarks	Small grits/ main temper	Big grits/ second temper	color
5153/1	2050	G2 / V	>12	14	-	many black, white, few quartz, gray	few black, white	surface: 7.5YR reddish yellow 7/6; core: 10YR pale brown 6/3
6701/2	3599	N1 / V	15	16	soot at the bottom and nozzle in and out	few white and gray	-	surface: 10YR very pale brown 8/4; core: 7.5YR pink 7/4
6660/1	3609	N1 / V	-	-	sooted at the nozzle	few black	-	surface & core: 5YR reddish yellow 7/6
7247/11	4096	J1 / V	14	14	traces of fire in the nozzle	many black, few white, gray	few black, white	surface: 2.5YR light red 6/6; core: 7.5YR light brown 6/4
8212/1	5027	K2 / V	14	>10	soot at the bottom and in the nozzle	many quartz, white	-	surface: 5YR reddish yellow 6/8; core: 10YR gray 5/1
8191/1	5042	K2	-	-	traces of fire on rim			surface: 5YR reddish yellow 6/8; core: 10YR pale brown 6/3
9604/2	6178	R / V	17	16	soot at the nozzle	very many black	few white	surface: 7.5YR reddish yellow 7/6; core: 7.5YR pink 7/4
7666/1	5266 K	K / IV	>15	15	traces of fire at the nozzle	many black and white	many white, gray	surface: 5YR reddish yellow 6/8; core: 10YR light rownish gray 6/2
10231/4	4210	U1	12	14	soot at the nozzle	chalk, much, coarse	basalt, much, medium	out: 2.5Y 7/4; in: 2.5Y 8/2; core: 10YR 6/3

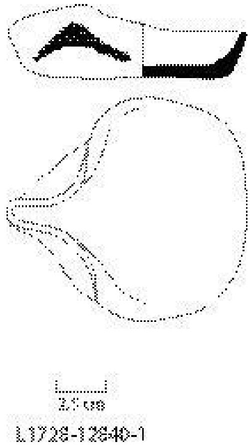
LP02B Simple Rimmed Lamps with Long, Narrow Nozzle





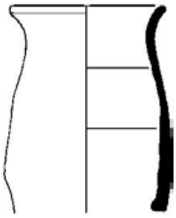
LP03 Hand Made Lamps

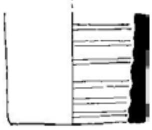




LP02B Simple Rimmed Lamps with Long, Narrow Nozzle								
Reg.no	Locus	Area, Phase	width cm	length cm	remarks	main temper	second temper	color
14410/1	1849	S	147	157	sooted	sand, little, medium		out: 10R red 4/6
14367/2	1838	S			sooted			out: 5YR reddish yellow 6/6
10295/2	4227	U3B	140	-	rim shard	basalt, medium, small	chalk, little, small	surfaces: 10YR 7/3; core 10YR 5/1
10308/23	4244	U3B	-	-	rim shard	organic, medium, medium	chalk, medium, coarse	out: 5YR 7/6; in: 5YR 7/4; core: 7.5YR N4
10609/3	4303	U3A	-	-	rim shard	basalt, much, small	chalk, little, coarse	surfaces: 7.5YR 7/4; core: 10YR 5/1
10823/3	4212	U3A	15		rim shard	chalk, medium, coarse	dark minerals, medium, coarse	out: 7.5YR pink 7/4; in N 6/0; core: N 3/0
11056/9	9899	R			base frag.	organic, little, medium	chalk, little, small	out: 5YR 7/6; in: 5YR 6/4; core: 2.5Y N4
LP03 Hand Made Lamps						Small grits	Big grits	
9280/1	6105	R / V	7	8		black, white	few white	surface: 5YR reddish yellow 6/8; core: 7.5YR brown 5/2
12840/1	1728	S	11.5	12		basalt, much, med.	chalk, little, coarse	out: 2.5Yr 5/6; in: 5YR 6/4; core: 10YR 5/2

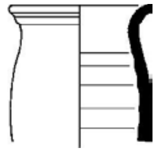
ST01A Simple Stands/Pipes

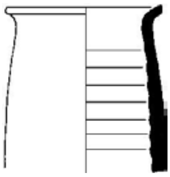

7719/1

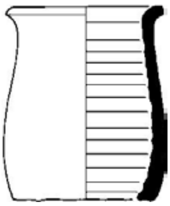

7719/2

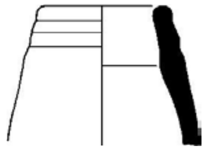

7719/3

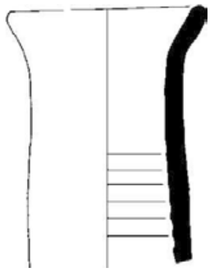

7719/4

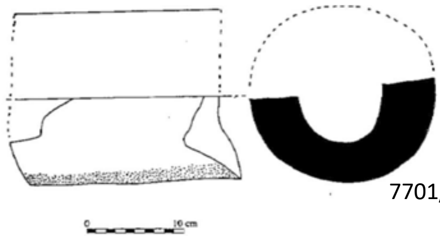

7719/5


7719/6

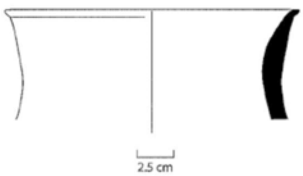

7790/1


7687/6


8723/1



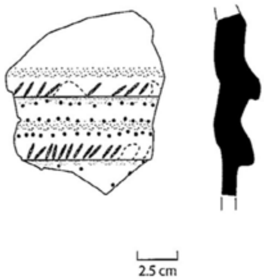
7701/1



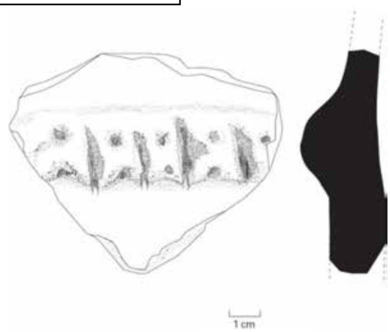
L 5439-12120-12

ST01A Simple Stands/Pipes							
Reg.no	Locus	Area, Phase	width cm	remarks	Small grits / main temper	Big grits / second temper	color
7719/1	5281K	K3/VI	12.5		many black	black, white	surface: 5YR reddish yellow 7/8; core: 10YR very pale brown 7/4
7719/2	5281K	K3/VI	11		many black and white	very few white	surface: 2.5YR light red 6/8; core: 5YR reddish yellow 6/6
7719/3	5281K	K3/VI	15		many black and white	very few white	surface: 2.5YR light red 6/8; core: 5YR reddish yellow 6/6
7719/4	5281K	K3/VI	12		many black and white	very few white	surface: 2.5YR light red 6/8; core: 5YR reddish yellow 6/6
7719/5	5281K	K3/VI	11		many black and white	very few white	surface: 2.5YR light red 6/8; core: 5YR reddish yellow 6/6
7719/6	5281K	K3/VI	12.5		many black and white	very few white	surface: 2.5YR light red 6/8; core: 5YR reddish yellow 6/6
7790/1	5281K	K3/VI	12.5		many black and white	very few white	surface: 2.5YR light red 6/8; core: 5YR reddish yellow 6/6
7687/6	5277K	K / V	10.5		many black and white	white	surface: 5YR reddish yellow 6/6; core: 10YR light brownish gray 6/2
8723/1	5247	K1 / IV	16	chalky inner surface	many black, white, brown, gray	white	surface: 10YR yellow 7/6; core: 10YR brownish yellow 6/6
7701/1	5279K	K2 / V	20		many black	few white and gray	surface: 2.5YR light red 6/8; core: gray
12120/12	5439	W2	170		basalt, much, small	chalk, little, coarse	out: 7.5YR 6/4; in: 10YR 6/3; core: 7.5YR 5/4

ST01B Stands with Plastic Decoration



L 4263-10382/1

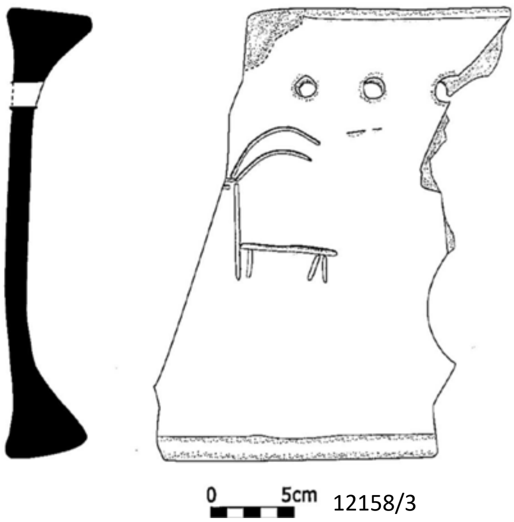


11819/1

ST02 Thick, Cylindrical Stand

10848/6

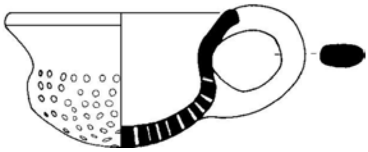
10972/4



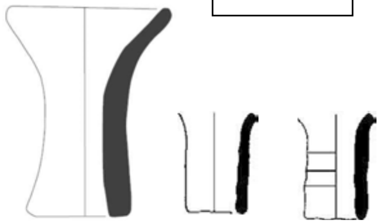
12158/3

Reg.no	Locus	Area, Phase	width cm	remarks	main temper	second temper	color
ST01B Stands with Plastic Decoration							
10382/1	4263	U0	10	incised diagonal strokes and dots	basalt, much, medium	chalk, medium, coarse	surfaces: 5YR 6/6; core: 10YR 5/2
11819/1	6619	R	33	incised diagonal strokes and dots	basalt, med., small	chalk, little, coarse	surfaces: 5YR pink 7/4; core: 2.5Y dark gray 4/1
ST02 Thick, Cylindrical Stand							
10848/6	4299	U3B	65	or basin (?) rim shard	basalt, much, small	chalk, little, coarse	out: 10YR 7/3; in: 7.5YR 7/3; core: 10YR 5/2
12158/3	5453	W2	30	holes drilled before firing, an incised ibex	basalt, much, small	chalk, little, medium	out: 5YR 6/6; in: 7.5YR pink 7/4; core: 10YR gray 4/1
12069/1	5418	W2	36	not illustrated	basalt, much, coarse	chalk, little, coarse	surfaces: 2.5YR 6/6; core: 10YR 6/2
10951/1	4348	U3A	16	red (5YR 6/6) slip; not illustrated	basalt, much, medium	quartz, medium, medium	10YR light yellowish brown 6/4
10972/4	4355	U3A	31	or basin (?)	basalt, much, small	chalk, little, coarse	out: 7.5YR pink 7/4; 7.5YR 8/3; core: 7.5YR 6/4
12181/1	5448	W1	31	not illustrated	basalt, much, medium	quartz, little, medium	out: 5YR 6/6; in: 5YR 6/4; 10YR 4/2

Strainer/Sieve



Funnel

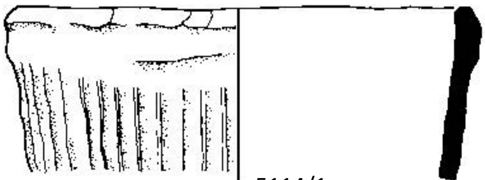


2,5 cm

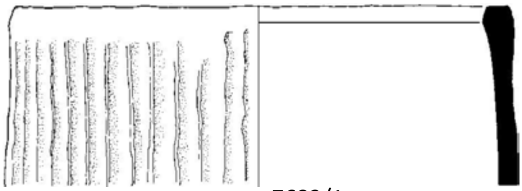
L.1721
12817_1

7715/1 7637/2

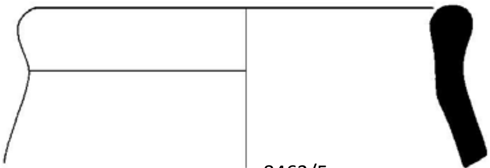
Basins



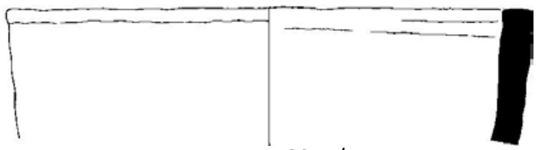
5114/1



7683/1



8463/5



8055/1

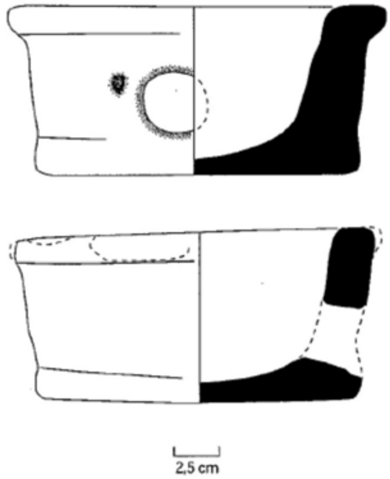
0 10 cm

Strainer/Sieve							
Reg.no	Locus	Area, Phase	width cm	remarks	Small grits	Big grits	color
7316/1	4095	J1 /V	8.5	traces of pale color inside	many gay and white	few very big white	out:10YR very pale brown 8/3; in: 5YR reddish yellow 7/6; core:7.5YR pinkish gray 6/2
Funnel					Small grits/ main temper	Big grits/ second temper	
12817/1	1721	S	5-10	11.5 cm high	basalt, little, medium	-	surfaces: 10YR 6/6; core: 10YR 6/3
7715/1	5278	K/IV	5		white, black	Few gray	surface: 10YR pale brown 6/3; core: 10YR grayish brown 5/2
7637/2	5262 K	K/IV	5		many black and white	white	surface: 7.5YR pink 7/4; core: 10YR gray 5/1
Basins							
5114/1	2050	G2 /V	43	vertical finger grooves	many brown, gray, white, quartz	many brown, white, few gray	out & core: 2.5YR red 4/8; in: 5Y pale yellow 8/3
8463/5	5088	K2 / V	43	slab-built	many white and gray small grits	few white, big grits	out: 5YR reddish yellow 7/6; in: 2.5Y white 8/2; core: 2.5YR light red 6/6
7683/1	5261	K / IV	43	vertical finger grooves	very many black and white	few white	out: 2.5YR light red 6/6; in: 2.5Y white 8/2; core: 2.5YR red 5/6
8055/1	5022	K / IV	43		many black and white	few very big black and white	out: 2.5YR light red 6/6; in: 2.5Y white 8/2; core: 10YR brown 5/3

Appendix 5N various vessels

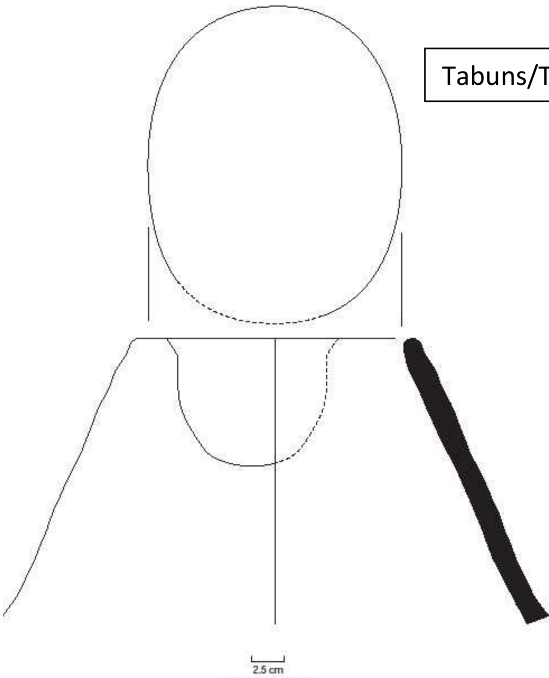
Molds

6463/1

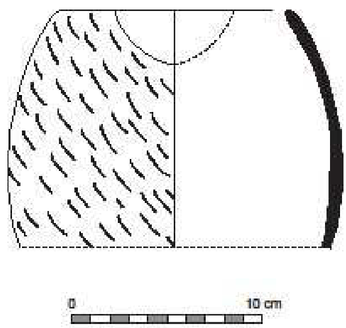


L4348-10951-1

Tabuns/Tannurs



L9904-11075/11



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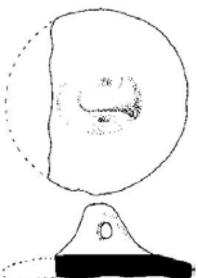
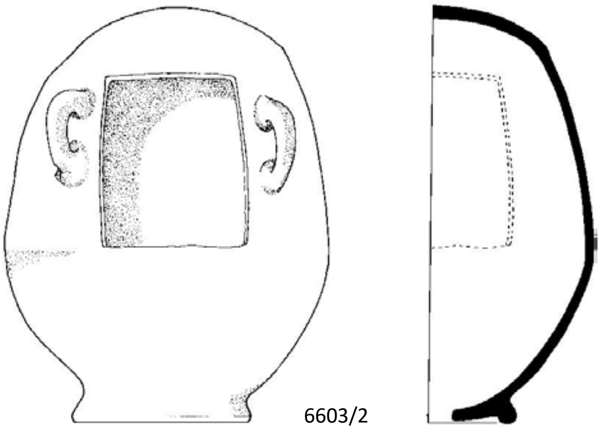
10103_1_1_5

Lid

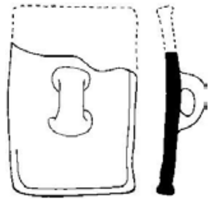


8691/1

Fenestrated Vessels

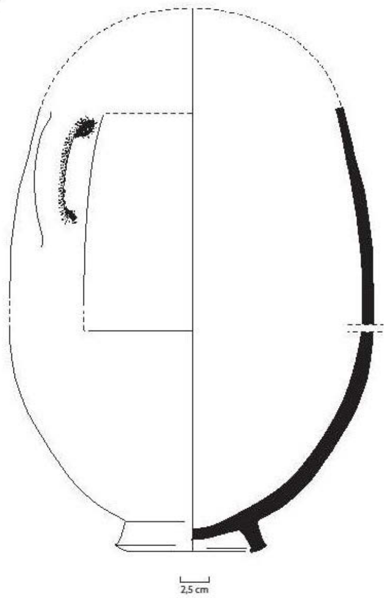


6603/2



6480/1

6480/5



10103/2

Molds							
Reg.no	Locus	Area, Phase	width cm	remarks	Small grits	Big grits	color
6463/1	3523	N		handmade	many black	-	5YR reddish yellow 7/6
10951/1	4348	U	16	10 cm high	basalt, much, med.	chalk, medium, coarse	surface: 10YR 6/4; red slip: 5YR 6/6
Tabuns/Tannurs							
11075/11	9904	R	25	rim width	basalt, medium, medium	chalk, little, medium	out; 5YR reddish yellow 6/6; in: 7.5YR reddish yellow 8/6; core: 2.5YR red 5/6
10103/1	9010	T					
Lid							
8691/1	5237	K2 / V			many white, black	few white	surface: 7.5YR reddish yellow 7/6; core: 10YR very pale brown 7/3
Fenestrated vessels							
6603/2		N1 / V					
6480/1	3531	N2 / VI		fitting door	many black, white, few gray	white, few gray	surface: 7.5YR reddish yellow 7/6; core: 7.5YR dark gray N4
6480/5	3531	N2 / VI	body shard, handle		many white		surface: 7.5YR reddish yellow 7/6; core: 7.5YR dark gray N4
10103/2	9010	T	31		basalt, medium, s	organic, little	out: 7.5YR 5/8; in: 5YR 5/8; core: 5YR 6/3

Correlation matrices of the Tel Kinrot pottery (KRP excavtions, Areas U and W)

1. When all rim shards are included (generally small correlations)

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ex	hue_in	val_cor	val_ex	val_in	chr_cor	chr_ex	chr_in
Diam	1.00	*0.45*	*0.352*	-0.132	0.14	9e-02	-2e-01	-0.16	0.021	0.191	-0.183	-0.19	*-0.38*	*-0.35*	*-0.31*	-0.26	-0.103	-0.049
R_max	0.45	1.00	**0.710**	-0.023	0.13	9e-02	2e-02	0.03	-0.095	0.153	-0.114	-0.10	-0.23	-0.14	-0.11	-0.19	0.040	0.016
Bel_r	0.35	0.71	1.000	-0.010	0.05	6e-02	8e-02	0.10	-0.056	0.038	0.004	0.04	-0.04	0.04	0.09	-0.01	0.040	0.006
Firing	-0.13	-0.02	-0.010	1.000	-0.12	-4e-02	1e-01	0.11	-0.035	0.004	0.045	0.06	0.11	0.15	0.13	0.02	0.062	0.043
Temp_q	0.14	0.13	0.051	-0.119	1.00	-5e-02	-7e-02	0.08	-0.037	0.024	-0.062	-0.07	-0.10	-0.10	-0.09	-0.02	0.057	0.079
Temp_s	0.09	0.09	0.058	-0.035	-0.05	1e+00	7e-04	-0.04	-0.024	0.095	-0.059	-0.05	-0.11	-0.15	-0.11	-0.12	-0.033	-0.065
Tem2_q	-0.20	0.02	0.078	0.096	-0.07	7e-04	1e+00	**0.52**	-0.123	0.016	0.158	0.18	0.24	0.27	0.26	0.08	0.108	0.073
Tem2_s	-0.16	0.03	0.096	0.106	0.08	-4e-02	5e-01	1.00	-0.062	-0.095	0.073	0.09	0.25	0.26	0.26	0.17	0.150	0.129
stratum	0.02	-0.09	-0.056	-0.035	-0.04	-2e-02	-1e-01	-0.06	1.000	-0.069	-0.086	-0.05	-0.03	-0.09	-0.10	0.05	-0.004	-0.005
hue_cor	0.19	0.15	0.038	0.004	0.02	9e-02	2e-02	-0.09	-0.069	1.000	0.012	0.04	**-0.43**	-0.20	-0.19	**-0.77**	-0.136	-0.123
hue_ex	-0.18	-0.11	0.004	0.045	-0.06	-6e-02	2e-01	0.07	-0.086	0.012	1.000	**0.68**	*0.36*	**0.55**	**0.44**	0.12	**-0.571**	*-0.375*
hue_in	-0.19	-0.10	0.041	0.061	-0.07	-5e-02	2e-01	0.09	-0.053	0.041	0.682	1.00	*0.32*	**0.44**	**0.43**	0.06	*-0.371*	**-0.598**
val_cor	-0.38	-0.23	-0.040	0.105	-0.10	-1e-01	2e-01	0.25	-0.030	-0.431	0.358	0.32	1.00	**0.63**	**0.63**	**0.64**	0.078	0.055
val_ex	-0.35	-0.14	0.036	0.147	-0.10	-2e-01	3e-01	0.26	-0.086	-0.202	0.548	0.44	0.63	1.00	**0.76**	*0.37*	-0.089	-0.048
val_in	-0.31	-0.11	0.092	0.134	-0.09	-1e-01	3e-01	0.26	-0.098	-0.194	0.443	0.43	0.63	0.76	1.00	*0.36*	-0.026	-0.044
chr_cor	-0.26	-0.19	-0.012	0.018	-0.02	-1e-01	8e-02	0.17	0.047	-0.769	0.120	0.06	0.64	0.37	0.36	1.00	0.164	0.168
chr_ex	-0.10	0.04	0.040	0.062	0.06	-3e-02	1e-01	0.15	-0.004	-0.136	-0.571	-0.37	0.08	-0.09	-0.03	0.16	1.000	**0.582**
chr_in	-0.05	0.02	0.006	0.043	0.08	-6e-02	7e-02	0.13	-0.005	-0.123	-0.375	-0.60	0.06	-0.05	-0.04	0.17	0.582	1.000

2. Rims of open vessels included

cor(Opencontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ex	hue_in	val_cor	val_ex	val_in	chr_cor	chr_ex	chr_in
Diam	1.00	**0.486**	*3e-01*	-0.036	0.165	2e-01	-0.18	-0.108	0.058	0.135	-0.22	-0.201	-0.32	*-0.31*	-0.28	-0.22	-0.06	-0.060
R_max	0.49	1.000	**6e-01**	0.038	0.050	1e-01	0.02	-0.003	-0.099	0.196	-0.12	-0.128	-0.22	-0.14	-0.13	-0.24	0.04	0.024
Bel_r	*0.33*	**0.589**	1e+00	0.086	-0.022	-7e-04	0.14	0.137	-0.080	0.044	0.08	0.074	0.10	0.18	0.20	0.02	0.08	0.066
Firing	-0.04	0.038	9e-02	1.000	-0.098	-5e-02	0.10	0.094	-0.060	0.003	0.05	0.071	0.12	0.16	0.16	0.02	0.06	0.034
Temp_q	0.16	0.050	-2e-02	-0.098	1.000	5e-02	-0.15	0.031	0.008	0.015	-0.07	-0.090	-0.10	-0.10	-0.09	-0.03	0.04	0.072
Temp_s	0.17	0.117	-7e-04	-0.051	0.045	1e+00	-0.07	-0.090	-0.043	0.163	-0.14	-0.099	-0.22	-0.24	-0.19	-0.21	-0.07	-0.076
Tem2_q	-0.18	0.016	1e-01	0.101	-0.147	-7e-02	1.00	**0.581**	-0.130	0.027	0.17	0.184	0.22	0.27	0.26	0.08	0.11	0.111
Tem2_s	-0.11	-0.003	1e-01	0.094	0.031	-9e-02	0.58	1.000	-0.067	-0.077	0.09	0.096	0.25	0.28	0.28	0.17	0.15	0.163
stratum	0.06	-0.099	-8e-02	-0.060	0.008	-4e-02	-0.13	-0.067	1.000	-0.066	-0.06	-0.043	-0.02	-0.09	-0.09	0.05	-0.01	-0.002
hue_cor	0.13	0.196	4e-02	0.003	0.015	2e-01	0.03	-0.077	-0.066	1.000	-0.01	0.002	**-0.45**	-0.22	-0.21	**-0.77**	-0.15	-0.116
hue_ex	-0.22	-0.125	8e-02	0.049	-0.068	-1e-01	0.17	0.095	-0.060	-0.014	1.00	**0.684**	*0.38*	**0.53**	**0.42**	0.17	**-0.51**	*-0.326*
hue_in	-0.20	-0.128	7e-02	0.071	-0.090	-1e-01	0.18	0.096	-0.043	0.002	0.68	1.000	*0.33*	**0.44**	**0.40**	0.12	*-0.34*	**-0.551**
val_cor	-0.32	-0.219	1e-01	0.118	-0.104	-2e-01	0.22	0.251	-0.015	-0.451	0.38	0.331	1.00	**0.66**	**0.65**	**0.69**	0.15	0.134
val_ex	-0.31	-0.135	2e-01	0.161	-0.099	-2e-01	0.27	0.279	-0.089	-0.219	0.53	0.444	0.66	1.00	**0.77**	**0.44**	0.04	0.043
val_in	-0.28	-0.125	2e-01	0.160	-0.095	-2e-01	0.26	0.284	-0.087	-0.208	0.42	0.401	0.65	0.77	1.00	**0.40**	0.07	0.051
chr_cor	-0.22	-0.244	2e-02	0.016	-0.029	-2e-01	0.08	0.167	0.050	-0.766	0.17	0.120	0.69	0.44	0.40	1.00	0.17	0.161
chr_ex	-0.06	0.044	8e-02	0.056	0.039	-7e-02	0.11	0.150	-0.014	-0.150	-0.51	-0.340	0.15	0.04	0.07	0.17	1.00	**0.600**
chr_in	-0.06	0.024	7e-02	0.034	0.072	-8e-02	0.11	0.163	-0.002	-0.116	-0.33	-0.551	0.13	0.04	0.05	0.16	0.60	1.000

Appendix 5O correlation matrices of continuous and ordinal variables

3. Rims of closed vessels included

cor(Closedcontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ex	hue_in	val_cor	val_ex	val_in	chr_cor	chr_ex	chr_in
Diam	1.00	**0.70**	**0.589**	-0.093	0.169	-1e-02	0.106	0.086	-0.140	0.05	0.049	0.033	-0.060	3e-02	0.092	-0.074	-0.055	-0.025
R_max	0.70	1.00	**0.786**	-0.097	0.196	-6e-02	0.079	0.164	-0.122	0.10	-0.037	-0.023	-0.189	-2e-02	-0.029	-0.115	0.044	0.010
Bel_r	0.59	0.79	1.000	-0.063	0.134	-1e-01	0.052	0.088	-0.115	0.17	-0.003	0.044	-0.185	-8e-03	0.035	-0.162	0.029	-0.032
Firing	-0.09	-0.10	-0.063	1.000	-0.120	-4e-02	0.049	0.083	0.024	0.10	-0.003	0.005	-0.041	6e-03	0.005	-0.094	0.050	0.065
Temp_q	0.17	0.20	0.134	-0.120	1.000	-2e-01	0.185	0.230	-0.115	-0.03	-0.025	-0.018	-0.002	-7e-03	-0.007	0.096	0.098	0.101
Temp_s	-0.01	-0.06	-0.101	-0.037	-0.182	1e+00	0.161	0.042	-0.052	0.06	0.075	0.095	0.049	2e-04	0.023	-0.068	0.018	-0.091
Tem2_q	0.11	0.08	0.052	0.049	0.185	2e-01	1.000	0.245	-0.150	0.13	0.107	0.131	0.091	9e-02	0.124	-0.078	0.009	-0.040
Tem2_s	0.09	0.16	0.088	0.083	0.230	4e-02	0.245	1.000	-0.060	-0.02	-0.014	-0.013	0.018	2e-02	0.034	0.005	0.086	0.046
stratum	-0.14	-0.12	-0.115	0.024	-0.115	-5e-02	-0.150	-0.060	1.000	-0.07	-0.145	-0.063	-0.079	-1e-01	-0.158	0.035	0.051	-0.007
hue_cor	0.05	0.10	0.167	0.103	-0.030	6e-02	0.128	-0.017	-0.071	1.00	0.119	0.233	*-0.302*	-4e-02	-0.031	**-0.734**	-0.080	-0.151
hue_ex	0.05	-0.04	-0.003	-0.003	-0.025	7e-02	0.107	-0.014	-0.145	0.12	1.000	**0.655**	0.276	6e-01	**0.457**	-0.054	**-0.757**	**-0.474**
hue_in	0.03	-0.02	0.044	0.005	-0.018	1e-01	0.131	-0.013	-0.063	0.23	0.655	1.000	0.196	4e-01	*0.389*	-0.168	**-0.510**	**-0.722**
val_cor	-0.06	-0.19	-0.185	-0.041	-0.002	5e-02	0.091	0.018	-0.079	-0.30	0.276	0.196	1.000	4e-01	**0.434**	**0.481**	-0.166	-0.115
val_ex	0.03	-0.02	-0.008	0.006	-0.007	2e-04	0.086	0.021	-0.098	-0.04	0.647	0.390	0.396	1e+00	**0.619**	0.079	**-0.539**	*-0.309*
val_in	0.09	-0.03	0.035	0.005	-0.007	2e-02	0.124	0.034	-0.158	-0.03	0.457	0.389	0.434	6e-01	1.000	0.125	*-0.357*	-0.259
chr_cor	-0.07	-0.11	-0.162	-0.094	0.096	-7e-02	-0.078	0.005	0.035	-0.73	-0.054	-0.168	0.481	8e-02	0.125	1.000	0.114	0.195
chr_ex	-0.06	0.04	0.029	0.050	0.098	2e-02	0.009	0.086	0.051	-0.08	-0.757	-0.510	-0.166	-5e-01	-0.357	0.114	1.000	**0.557**
chr_in	-0.02	0.01	-0.032	0.065	0.101	-9e-02	-0.040	0.046	-0.007	-0.15	-0.474	-0.722	-0.115	-3e-01	-0.259	0.195	0.557	1.000

4. Rims of bowls only included

cor(bowlscontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ex	hue_in	val_cor	val_ex	val_in	chr_cor	chr_ex	chr_in
Diam	1.000	**0.449**	**0.608**	0.061	-0.076	0.164	-0.002	0.028	6e-02	0.114	-0.075	-0.05	-0.105	-0.063	-4e-02	-0.119	0.01	-0.01
R_max	0.449	1.000	**0.715**	0.137	0.041	0.082	0.035	0.095	-2e-01	0.231	-0.082	-0.08	-0.122	-0.003	5e-02	-0.239	0.12	0.07
Bel_r	0.608	0.715	1.000	0.078	0.001	0.172	0.022	0.089	-5e-02	0.207	-0.077	-0.06	-0.126	-0.029	4e-02	-0.190	0.08	0.04
Firing	0.061	0.137	0.078	1.000	-0.105	0.035	0.012	-0.047	-6e-02	0.096	0.008	0.06	-0.057	0.054	2e-02	-0.105	-0.03	-0.05
Temp_q	-0.076	0.041	0.001	-0.105	1.000	-0.139	0.146	*0.312*	-5e-02	0.046	0.021	-0.05	-0.126	0.017	1e-02	-0.065	0.09	0.17
Temp_s	0.164	0.082	0.172	0.035	-0.139	1.000	0.032	-0.005	-9e-03	0.067	0.014	0.06	0.071	0.038	6e-02	-0.008	-0.08	-0.10
Tem2_q	-0.002	0.035	0.022	0.012	0.146	0.032	1.000	*0.341*	-7e-02	0.095	0.059	0.05	-0.003	0.042	-6e-03	-0.058	0.06	0.04
Tem2_s	0.028	0.095	0.089	-0.047	0.312	-0.005	0.341	1.000	-7e-03	-0.043	-0.041	-0.07	0.006	0.055	6e-02	0.064	0.10	0.17
stratum	0.057	-0.180	-0.051	-0.064	-0.054	-0.009	-0.074	-0.007	1e+00	-0.112	-0.051	-0.03	0.021	-0.060	-2e-04	0.100	-0.05	-0.05
hue_cor	0.114	0.231	0.207	0.096	0.046	0.067	0.095	-0.043	-1e-01	1.000	0.232	0.27	*-0.339*	0.006	-2e-03	**-0.783**	-0.17	-0.16
hue_ex	-0.075	-0.082	-0.077	0.008	0.021	0.014	0.059	-0.041	-5e-02	0.232	1.000	**0.68**	0.173	**0.493**	3e-01	-0.104	**-0.71**	**-0.48**
hue_in	-0.052	-0.083	-0.056	0.061	-0.051	0.060	0.050	-0.069	-3e-02	0.266	0.681	1.00	0.117	*0.388*	3e-01	-0.174	**-0.52**	**-0.70**
val_cor	-0.105	-0.122	-0.126	-0.057	-0.126	0.071	-0.003	0.006	2e-02	-0.339	0.173	0.12	1.000	*0.335*	*4e-01*	**0.530**	-0.05	-0.04
val_ex	-0.063	-0.003	-0.029	0.054	0.017	0.038	0.042	0.055	-6e-02	0.006	0.493	0.39	0.335	1.000	**6e-01**	0.103	*-0.36*	-0.25
val_in	-0.044	0.051	0.044	0.022	0.012	0.056	-0.006	0.056	-2e-04	-0.002	0.285	0.29	0.382	0.554	1e+00	0.091	-0.20	-0.22
chr_cor	-0.119	-0.239	-0.190	-0.105	-0.065	-0.008	-0.058	0.064	1e-01	-0.783	-0.104	-0.17	0.530	0.103	9e-02	1.000	0.10	0.12
chr_ex	0.012	0.117	0.078	-0.028	0.092	-0.078	0.062	0.102	-5e-02	-0.166	-0.709	-0.52	-0.053	-0.357	-2e-01	0.104	1.00	**0.58**
chr_in	-0.013	0.065	0.043	-0.052	0.168	-0.095	0.044	0.171	-5e-02	-0.162	-0.483	-0.70	-0.040	-0.248	-2e-01	0.122	0.58	1.00

5. Rims of kraters only included

cor(kraterscontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ext	hue_int	val_cor	val_ext	val_int	chr_cor	chr_ext	chr_int
Diam	1.000	0.27	4e-01	-0.006	0.096	-0.05	0.034	0.168	0.052	-0.034	-0.009	0.103	1e-01	0.083	0.17	0.102	-0.08	-0.10
R_max	0.269	1.00	7e-01	-0.024	-0.171	0.08	0.154	-0.026	-0.042	*0.307*	0.103	0.162	-8e-02	0.119	0.16	-0.223	-0.06	-0.11
Bel_r	0.394	0.71	1e+00	0.003	-0.058	0.02	0.160	0.035	-0.034	0.164	0.143	0.191	-7e-04	0.130	0.20	-0.081	-0.14	-0.15
Firing	-0.006	-0.02	3e-03	1.000	-0.154	0.09	0.007	0.075	0.048	0.010	0.081	0.133	3e-02	0.072	0.12	-0.095	-0.10	-0.12
Temp_q	0.096	-0.17	-6e-02	-0.154	1.000	-0.21	0.137	0.231	-0.006	-0.193	-0.033	-0.002	2e-01	0.066	0.06	0.255	0.08	0.08
Temp_s	-0.053	0.08	2e-02	0.090	-0.207	1.00	0.132	0.055	-0.039	0.113	-0.021	-0.057	-3e-02	-0.050	-0.02	-0.156	0.05	0.04
Tem2_q	0.034	0.15	2e-01	0.007	0.137	0.13	1.000	0.101	-0.038	0.100	0.076	0.098	-3e-02	0.150	0.08	-0.044	-0.04	0.03
Tem2_s	0.168	-0.03	3e-02	0.075	0.231	0.06	0.101	1.000	0.022	0.005	0.032	0.066	1e-01	0.059	0.10	0.013	-0.03	0.05
stratum	0.052	-0.04	-3e-02	0.048	-0.006	-0.04	-0.038	0.022	1.000	-0.038	-0.116	-0.066	2e-02	-0.085	-0.09	0.005	0.11	0.09
hue_cor	-0.034	0.31	2e-01	0.010	-0.193	0.11	0.100	0.005	-0.038	1.000	0.001	0.009	-3e-01	-0.003	-0.07	**-0.740**	0.02	0.01
hue_ext	-0.009	0.10	1e-01	0.081	-0.033	-0.02	0.076	0.032	-0.116	0.001	1.000	**0.673**	2e-01	**0.651**	*0.40*	0.105	**-0.71**	*-0.44*
hue_int	0.103	0.16	2e-01	0.133	-0.002	-0.06	0.098	0.066	-0.066	0.009	0.673	1.000	3e-01	**0.508**	**0.58**	0.088	*-0.47*	**-0.66**
val_cor	0.096	-0.08	-7e-04	0.025	0.183	-0.03	-0.027	0.098	0.015	-0.345	0.235	0.282	1e+00	*0.345*	*0.40*	**0.567**	-0.09	-0.08
val_ext	0.083	0.12	1e-01	0.072	0.066	-0.05	0.150	0.059	-0.085	-0.003	0.651	0.508	3e-01	1.000	**0.60**	0.143	**-0.52**	*-0.32*
val_int	0.170	0.16	2e-01	0.123	0.056	-0.02	0.084	0.104	-0.093	-0.070	0.397	0.576	4e-01	0.603	1.00	0.206	*-0.30*	*-0.37*
chr_cor	0.102	-0.22	-8e-02	-0.095	0.255	-0.16	-0.044	0.013	0.005	-0.740	0.105	0.088	6e-01	0.143	0.21	1.000	-0.05	-0.02
chr_ext	-0.078	-0.06	-1e-01	-0.097	0.085	0.05	-0.039	-0.031	0.113	0.019	-0.709	-0.475	-9e-02	-0.521	-0.30	-0.050	1.00	**0.58**
chr_int	-0.099	-0.11	-2e-01	-0.121	0.084	0.04	0.032	0.053	0.091	0.013	-0.444	-0.665	-8e-02	-0.323	-0.37	-0.018	0.58	1.00

6. Rims of cooking pots only included

cor(cookingcontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ex	hue_in	val_cor	val_ex	val_in	chr_cor	chr_ex	chr_in
Diam	1.00	0.122	0.098	-0.03	0.181	0.027	-0.22	-0.125	0.141	-0.055	-0.12	-0.127	-0.09	-0.147	-0.139	0.048	0.01	-0.017
R_max	0.12	1.000	0.280	0.05	-0.017	-0.009	0.06	0.055	-0.057	0.038	-0.06	-0.096	-0.05	-0.022	-0.098	-0.010	0.10	0.086
Bel_r	0.10	0.280	1.000	0.01	0.009	0.063	0.09	0.081	-0.134	0.038	-0.02	-0.033	-0.06	-0.009	-0.018	0.006	0.02	0.038
Firing	-0.03	0.049	0.014	1.00	-0.046	-0.060	0.09	0.102	-0.138	0.065	-0.04	-0.025	0.07	0.143	0.135	-0.075	0.06	0.093
Temp_q	0.18	-0.017	0.009	-0.05	1.000	0.293	*-0.37*	-0.181	0.072	-0.043	0.03	0.010	0.07	0.010	0.025	0.091	0.02	0.004
Temp_s	0.03	-0.009	0.063	-0.06	0.293	1.000	-0.01	0.030	-0.067	-0.004	-0.07	-0.077	0.08	0.015	0.092	0.096	0.12	0.122
Tem2_q	-0.22	0.058	0.086	0.09	-0.373	-0.012	1.00	**0.708**	-0.203	0.142	0.07	0.124	0.08	0.113	0.140	-0.120	0.06	0.076
Tem2_s	-0.13	0.055	0.081	0.10	-0.181	0.030	0.71	1.000	-0.151	0.049	-0.04	0.007	0.08	0.096	0.133	-0.048	0.09	0.071
stratum	0.14	-0.057	-0.134	-0.14	0.072	-0.067	-0.20	-0.151	1.000	-0.083	-0.04	-0.050	-0.08	-0.225	-0.246	0.082	-0.06	-0.002
hue_cor	-0.05	0.038	0.038	0.07	-0.043	-0.004	0.14	0.049	-0.083	1.000	0.11	0.072	*-0.35*	0.040	0.050	**-0.793**	-0.08	-0.019
hue_ex	-0.12	-0.064	-0.024	-0.04	0.029	-0.065	0.07	-0.042	-0.037	0.113	1.00	**0.563**	0.08	0.079	0.084	-0.082	**-0.57**	*-0.377*
hue_in	-0.13	-0.096	-0.033	-0.02	0.010	-0.077	0.12	0.007	-0.050	0.072	0.56	1.000	0.08	0.080	0.007	-0.065	*-0.37*	**-0.627**
val_cor	-0.09	-0.049	-0.063	0.07	0.065	0.081	0.08	0.079	-0.076	-0.354	0.08	0.076	1.00	0.242	0.229	**0.439**	0.10	0.099
val_ex	-0.15	-0.022	-0.009	0.14	0.010	0.015	0.11	0.096	-0.225	0.040	0.08	0.080	0.24	1.000	**0.535**	0.027	0.21	0.101
val_in	-0.14	-0.098	-0.018	0.14	0.025	0.092	0.14	0.133	-0.246	0.050	0.08	0.007	0.23	0.535	1.000	-0.020	0.10	0.188
chr_cor	0.05	-0.010	0.006	-0.08	0.091	0.096	-0.12	-0.048	0.082	-0.793	-0.08	-0.065	0.44	0.027	-0.020	1.000	0.11	0.079
chr_ex	0.01	0.099	0.016	0.06	0.024	0.119	0.06	0.094	-0.063	-0.076	-0.57	-0.366	0.10	0.209	0.099	0.106	1.00	**0.568**
chr_in	-0.02	0.086	0.038	0.09	0.004	0.122	0.08	0.071	-0.002	-0.019	-0.38	-0.627	0.10	0.101	0.188	0.079	0.57	1.000

Appendix 5O correlation matrices of continuous and ordinal variables

7. Rims of jars only included

cor(jarscontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ex	hue_in	val_cor	val_ex	val_in	chr_cor	chr_ex	chr_in
Diam	1.000	**0.530**	**0.634**	5e-02	-0.090	0.297	0.028	0.003	0.10	0.021	-0.035	-0.003	-0.07	-0.05	0.010	-0.10	-5e-02	-0.04
R_max	0.530	1.000	**0.741**	4e-02	-0.001	0.290	0.036	0.055	-0.01	0.066	0.004	-0.017	-0.20	-0.03	-0.031	-0.14	-2e-02	0.02
Bel_r	0.634	0.741	1.000	5e-02	-0.070	*0.340*	-0.003	-0.068	0.09	0.105	-0.034	-0.023	-0.26	-0.12	-0.095	-0.18	-5e-02	-0.05
Firing	0.055	0.040	0.051	1e+00	-0.113	0.007	0.010	0.028	-0.02	0.092	0.023	0.032	-0.03	0.05	0.018	-0.07	5e-04	0.02
Temp_q	-0.090	-0.001	-0.070	-1e-01	1.000	-0.221	0.091	0.112	-0.11	-0.077	-0.096	-0.089	0.04	-0.04	-0.007	0.14	2e-01	0.21
Temp_s	0.297	0.290	0.340	7e-03	-0.221	1.000	0.110	-0.010	-0.03	0.019	0.016	-0.016	-0.01	-0.04	0.003	-0.06	-2e-02	-0.02
Tem2_q	0.028	0.036	-0.003	1e-02	0.091	0.110	1.000	*0.321*	-0.05	0.108	0.076	0.099	0.19	0.18	0.221	-0.02	1e-01	0.09
Tem2_s	0.003	0.055	-0.068	3e-02	0.112	-0.010	0.321	1.000	-0.07	-0.053	-0.004	-0.016	0.19	0.16	0.226	0.08	2e-01	0.13
stratum	0.101	-0.013	0.092	-2e-02	-0.113	-0.030	-0.046	-0.071	1.00	-0.068	-0.122	-0.095	-0.09	-0.07	-0.139	0.06	-2e-02	0.02
hue_cor	0.021	0.066	0.105	9e-02	-0.077	0.019	0.108	-0.053	-0.07	1.000	0.107	0.166	*-0.33*	-0.05	-0.003	**-0.70**	-2e-02	-0.05
hue_ex	-0.035	0.004	-0.034	2e-02	-0.096	0.016	0.076	-0.004	-0.12	0.107	1.000	**0.684**	0.23	**0.54**	**0.414**	-0.02	**-7e-01**	**-0.46**
hue_in	-0.003	-0.017	-0.023	3e-02	-0.089	-0.016	0.099	-0.016	-0.09	0.166	0.684	1.000	0.20	*0.39*	**0.414**	-0.10	**-5e-01**	**-0.67**
val_cor	-0.074	-0.198	-0.263	-3e-02	0.040	-0.011	0.191	0.195	-0.09	-0.327	0.232	0.204	1.00	**0.49**	**0.534**	**0.54**	-3e-02	-0.06
val_ex	-0.046	-0.026	-0.116	5e-02	-0.038	-0.035	0.183	0.160	-0.07	-0.046	0.544	0.388	0.49	1.00	**0.681**	0.17	-3e-01	-0.22
val_in	0.010	-0.031	-0.095	2e-02	-0.007	0.003	0.221	0.226	-0.14	-0.003	0.414	0.414	0.53	0.68	1.000	0.17	-2e-01	-0.21
chr_cor	-0.102	-0.135	-0.183	-7e-02	0.140	-0.056	-0.022	0.080	0.06	-0.703	-0.017	-0.104	0.54	0.17	0.173	1.00	1e-01	0.18
chr_ex	-0.054	-0.021	-0.054	5e-04	0.169	-0.020	0.105	0.161	-0.02	-0.022	-0.714	-0.509	-0.03	-0.33	-0.207	0.11	1e+00	**0.63**
chr_in	-0.044	0.024	-0.046	2e-02	0.214	-0.019	0.085	0.127	0.02	-0.053	-0.463	-0.669	-0.06	-0.22	-0.215	0.18	6e-01	1.00

8. Rims of jugs only included

cor(jugscontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ext	hue_int	val_cor	val_ext	val_int	chr_cor	chr_ext	chr_int
Diam	1.000	3e-01	0.09	-6e-03	0.06	-0.030	0.11	1e-02	-0.17	-0.117	0.18	-0.02	8e-02	0.108	1e-01	2e-01	-0.140	9e-02
R_max	0.299	1e+00	*0.48*	-4e-02	0.09	0.022	0.06	3e-02	-0.05	-0.024	0.01	-0.11	-1e-04	0.015	-8e-02	3e-02	-0.007	9e-02
Bel_r	0.092	5e-01	1.00	-3e-02	0.04	-0.033	-0.02	-7e-02	-0.06	0.091	0.05	0.02	-4e-02	0.060	5e-02	-8e-02	-0.048	-2e-02
Firing	-0.006	-4e-02	-0.03	1e+00	-0.09	-0.077	0.03	1e-01	-0.04	0.157	-0.07	-0.07	-1e-01	-0.049	-4e-04	-2e-01	0.018	6e-02
Temp_q	0.062	9e-02	0.04	-9e-02	1.00	-0.058	0.22	3e-01	-0.12	-0.053	0.08	0.05	4e-02	0.092	9e-02	2e-01	0.056	8e-02
Temp_s	-0.030	2e-02	-0.03	-8e-02	-0.06	1.000	0.16	1e-01	-0.01	0.042	0.08	0.15	2e-02	-0.009	1e-02	-5e-02	0.034	-1e-01
Tem2_q	0.106	6e-02	-0.02	3e-02	0.22	0.159	1.00	*3e-01*	-0.20	0.106	0.11	0.16	2e-02	0.066	1e-01	-7e-02	-0.024	-1e-01
Tem2_s	0.010	3e-02	-0.07	1e-01	0.29	0.117	0.30	1e+00	-0.08	0.006	0.06	0.06	-6e-03	-0.019	1e-02	1e-04	-0.035	3e-04
stratum	-0.174	-5e-02	-0.06	-4e-02	-0.12	-0.013	-0.20	-8e-02	1.00	-0.070	-0.20	-0.10	-8e-02	-0.178	-2e-01	4e-02	0.095	2e-02
hue_cor	-0.117	-2e-02	0.09	2e-01	-0.05	0.042	0.11	6e-03	-0.07	1.000	0.13	0.27	-3e-01	-0.055	-4e-02	**-8e-01**	-0.138	-2e-01
hue_ext	0.183	1e-02	0.05	-7e-02	0.08	0.082	0.11	6e-02	-0.20	0.125	1.00	**0.64**	3e-01	**0.669**	**5e-01**	-4e-02	**-0.741**	**-5e-01**
hue_int	-0.020	-1e-01	0.02	-7e-02	0.05	0.147	0.16	6e-02	-0.10	0.274	0.64	1.00	2e-01	*0.393*	*5e-01*	-2e-01	*-0.499*	**-8e-01**
val_cor	0.084	-1e-04	-0.04	-1e-01	0.04	0.022	0.02	-6e-03	-0.08	-0.291	0.29	0.21	1e+00	*0.403*	4e-01	4e-01	-0.252	-2e-01
val_ext	0.108	1e-02	0.06	-5e-02	0.09	-0.009	0.07	-2e-02	-0.18	-0.055	0.67	0.39	4e-01	1.000	**6e-01**	7e-02	**-0.552**	-3e-01
val_int	0.113	-8e-02	0.05	-4e-04	0.09	0.012	0.12	1e-02	-0.17	-0.040	0.53	0.46	4e-01	0.632	1e+00	1e-01	*-0.404*	-3e-01
chr_cor	0.154	3e-02	-0.08	-2e-01	0.16	-0.055	-0.07	1e-04	0.04	-0.751	-0.04	-0.17	4e-01	0.074	1e-01	1e+00	0.111	2e-01
chr_ext	-0.140	-7e-03	-0.05	2e-02	0.06	0.034	-0.02	-3e-02	0.10	-0.138	-0.74	-0.50	-3e-01	-0.552	-4e-01	1e-01	1.000	**5e-01**
chr_int	0.094	9e-02	-0.02	6e-02	0.08	-0.148	-0.14	3e-04	0.02	-0.219	-0.49	-0.76	-2e-01	-0.316	-3e-01	2e-01	0.537	1e+00

9. Rims of pithoi only included

cor(pithoicontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ext	hue_int	val_cor	val_ext	val_int	chr_cor	chr_ext	chr_int
Diam	1.00	0.22	1e-01	-0.03	0.06	-0.163	2e-01	-0.229	-0.066	0.13	3e-02	9e-02	0.18	0.02	0.21	-6e-02	-0.12	0.04
R_max	0.22	1.00	**5e-01**	-0.17	0.26	*-0.372*	6e-02	-0.088	0.142	0.06	-3e-01	-1e-02	*-0.39*	*-0.35*	-0.17	-1e-01	*0.38*	-0.03
Bel_r	0.11	0.50	1e+00	-0.14	0.28	*-0.481*	2e-01	-0.121	0.102	0.10	1e-04	-6e-04	-0.11	0.04	0.16	-2e-01	0.05	0.08
Firing	-0.03	-0.17	-1e-01	1.00	-0.16	0.158	1e-01	0.146	0.115	0.13	1e-01	6e-02	-0.16	0.10	0.09	-2e-01	-0.11	0.07
Temp_q	0.06	0.26	3e-01	-0.16	1.00	**-0.533**	3e-02	0.148	-0.105	0.08	-2e-02	1e-02	-0.07	-0.02	-0.19	-2e-01	0.15	-0.08
Temp_s	-0.16	-0.37	-5e-01	0.16	-0.53	1.000	6e-03	-0.026	0.008	-0.07	2e-02	2e-01	0.10	-0.06	0.06	2e-01	0.06	-0.09
Tem2_q	0.19	0.06	2e-01	0.12	0.03	0.006	1e+00	0.194	-0.095	0.04	3e-01	3e-01	*0.40*	0.16	0.23	2e-20	-0.12	-0.12
Tem2_s	-0.23	-0.09	-1e-01	0.15	0.15	-0.026	2e-01	1.000	0.006	-0.11	-3e-01	-2e-01	-0.22	-0.07	-0.18	2e-02	0.22	0.14
stratum	-0.07	0.14	1e-01	0.11	-0.10	0.008	-9e-02	0.006	1.000	0.05	-2e-01	-2e-02	*-0.31*	-0.14	-0.15	-2e-01	0.19	-0.02
hue_cor	0.13	0.06	1e-01	0.13	0.08	-0.072	4e-02	-0.110	0.048	1.00	2e-01	*4e-01*	-0.09	0.22	*0.32*	**-9e-01**	-0.14	-0.21
hue_ext	0.03	-0.28	1e-04	0.13	-0.02	0.015	3e-01	-0.251	-0.156	0.24	1e+00	**7e-01**	*0.48*	**0.76**	*0.48*	-2e-01	**-0.81**	**-0.50**
hue_int	0.09	-0.01	-6e-04	0.06	0.01	0.167	3e-01	-0.220	-0.017	0.44	7e-01	1e+00	*0.45*	**0.53**	**0.55**	-3e-01	*-0.45*	**-0.74**
val_cor	0.18	-0.39	-1e-01	-0.16	-0.07	0.096	4e-01	-0.221	-0.312	-0.09	5e-01	4e-01	1.00	*0.37*	*0.47*	3e-01	*-0.37*	*-0.38*
val_ext	0.02	-0.35	4e-02	0.10	-0.02	-0.057	2e-01	-0.072	-0.142	0.22	8e-01	5e-01	0.37	1.00	*0.49*	-3e-01	**-0.70**	*-0.38*
val_int	0.21	-0.17	2e-01	0.09	-0.19	0.057	2e-01	-0.176	-0.146	0.32	5e-01	5e-01	0.47	0.49	1.00	-2e-01	*-0.42*	*-0.34*
chr_cor	-0.06	-0.11	-2e-01	-0.15	-0.22	0.186	2e-20	0.018	-0.152	-0.86	-2e-01	-3e-01	0.28	-0.28	-0.22	1e+00	0.13	0.09
chr_ext	-0.12	0.38	5e-02	-0.11	0.15	0.065	-1e-01	0.223	0.192	-0.14	-8e-01	-5e-01	-0.37	-0.70	-0.42	1e-01	1.00	*0.41*
chr_int	0.04	-0.03	8e-02	0.07	-0.08	-0.090	-1e-01	0.143	-0.016	-0.21	-5e-01	-7e-01	-0.38	-0.38	-0.34	9e-02	0.41	1.00

10. Rims of small containers only included

cor(smallcontinuous, use="pairwise.complete.obs")

	Diam	R_max	Bel_r	Firing	Temp_q	Temp_s	Tem2_q	Tem2_s	stratum	hue_cor	hue_ext	hue_int	val_cor	val_ext	val_int	chr_cor	chr_ext	chr_int
Diam	1.000	*0.39*	**6e-01**	-0.19	-0.017	-0.014	*-0.37*	0.05	-0.08	-0.009	*-0.37*	-0.249	-0.039	-0.226	0.19	-1e-01	0.26	*0.3*
R_max	0.389	1.00	**7e-01**	0.09	-0.029	-0.129	0.17	-0.09	-0.21	0.186	-0.02	-0.152	0.135	0.011	0.19	3e-02	0.22	*0.4*
Bel_r	0.563	0.65	1e+00	0.09	0.028	-0.077	-0.17	0.05	-0.16	0.199	0.16	0.142	*0.349*	0.088	0.13	-9e-04	0.10	0.2
Firing	-0.191	0.09	9e-02	1.00	-0.077	-0.107	0.15	0.10	0.19	0.085	-0.03	-0.048	0.025	-0.195	-0.10	2e-01	*0.36*	0.2
Temp_q	-0.017	-0.03	3e-02	-0.08	1.000	*-0.430*	0.20	**0.52**	0.08	0.192	-0.03	0.228	-0.099	-0.007	*-0.33*	-3e-01	-0.05	-0.2
Temp_s	-0.014	-0.13	-8e-02	-0.11	-0.430	1.000	0.23	-0.05	-0.09	0.199	-0.06	0.009	-0.044	*-0.329*	*-0.35*	*-3e-01*	0.20	-0.2
Tem2_q	-0.372	0.17	-2e-01	0.15	0.198	0.228	1.00	0.11	-0.16	*0.435*	0.13	0.155	0.000	-0.119	-0.24	*-3e-01*	-0.06	-0.1
Tem2_s	0.052	-0.09	5e-02	0.10	0.518	-0.047	0.11	1.00	0.19	0.128	-0.05	0.135	-0.067	0.016	*-0.30*	-2e-01	0.03	*-0.3*
stratum	-0.083	-0.21	-2e-01	0.19	0.080	-0.087	-0.16	0.19	1.00	0.079	-0.04	0.240	-0.169	0.140	-0.23	-7e-02	-0.07	*-0.4*
hue_cor	-0.009	0.19	2e-01	0.08	0.192	0.199	0.44	0.13	0.08	1.000	0.17	*0.471*	0.007	0.001	*-0.30*	**-7e-01**	0.05	*-0.4*
hue_ext	-0.371	-0.02	2e-01	-0.03	-0.031	-0.064	0.13	-0.05	-0.04	0.172	1.00	**0.522**	**0.603**	**0.643**	*0.34*	1e-01	**-0.57**	-0.2
hue_int	-0.249	-0.15	1e-01	-0.05	0.228	0.009	0.16	0.14	0.24	0.471	0.52	1.000	0.279	*0.499*	-0.03	*-3e-01*	-0.29	**-0.6**
val_cor	-0.039	0.14	3e-01	0.03	-0.099	-0.044	0.00	-0.07	-0.17	0.007	0.60	0.279	1.000	0.255	*0.35*	**5e-01**	-0.12	0.2
val_ext	-0.226	0.01	9e-02	-0.20	-0.007	-0.329	-0.12	0.02	0.14	0.001	0.64	0.499	0.255	1.000	**0.55**	7e-02	**-0.70**	*-0.4*
val_int	0.190	0.19	1e-01	-0.10	-0.329	-0.347	-0.24	-0.30	-0.23	-0.298	0.34	-0.027	0.351	0.549	1.00	*4e-01*	*-0.41*	*0.3*
chr_cor	-0.124	0.03	-9e-04	0.19	-0.256	-0.286	-0.33	-0.19	-0.07	-0.655	0.11	-0.256	0.467	0.066	0.36	1e+00	0.13	**0.5**
chr_ext	0.260	0.22	1e-01	0.36	-0.049	0.196	-0.06	0.03	-0.07	0.051	-0.57	-0.295	-0.115	-0.705	-0.41	1e-01	1.00	*0.4*
chr_int	0.343	0.42	2e-01	0.18	-0.247	-0.185	-0.12	-0.28	-0.39	-0.389	-0.23	-0.603	0.208	-0.367	0.31	5e-01	0.42	1.0

Appendix 5Ocross table of rim forms and direction of the rim part

Rim form & direction

all	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	**106**	0	23	3	22	13	0	0	0	0	37	0	4	0	0	0	0	17	2	0	2	0	0	26	**68**	26	8	13	57	0	427
out	0	0	0	85	10	**144**	31	29	13	0	0	0	0	**155**	0	20	0	18	0	0	4	0	30	0	0	2	0	0	0	0	6	0	0	547
up	49	9	15	87	6	**170**	39	33	**75**	49	3	4	3	**155**	26	54	17	**179**	33	5	7	11	24	31	6	0	0	0	0	0	49	43	2	1184
Sum	49	9	15	**278**	16	**337**	73	84	101	49	3	4	3	**347**	26	78	17	**197**	33	5	28	13	54	33	6	2	26	68	26	8	68	100	2	2158
open	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	**106**	0	7	3	5	4	0	0	0	0	28	0	3	0	0	0	0	16	1	0	1	0	0	26	**68**	25	8	13	**56**	0	370
out	0	0	0	**74**	9	**72**	16	16	10	0	0	0	0	**81**	0	7	0	5	0	0	2	0	16	0	0	2	0	0	0	0	6	0	0	316
up	29	8	6	**80**	6	**101**	30	15	48	41	2	4	1	**72**	18	41	4	6	13	5	6	6	13	15	6	0	0	0	0	0	49	43	1	669
Sum	29	8	6	**260**	15	**180**	49	36	62	41	2	4	1	**181**	18	51	4	11	13	5	24	7	29	16	6	2	26	**68**	25	8	**68**	**99**	1	1355
cooking	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	**87**	0	1	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	23	**67**	19	4	13	**49**	0	268
out	0	0	0	**57**	8	6	5	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	6	0	0	99
up	1	0	0	**56**	4	0	0	1	1	0	0	0	0	1	5	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	**48**	**43**	0	163
Sum	1	0	0	**200**	12	7	5	1	1	0	0	0	0	15	5	0	0	0	0	0	0	0	9	2	0	0	23	**67**	19	4	**67**	**92**	0	530
bowls	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	1	0	6	2	15	2	0	0	0	0	2	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	31
out	0	0	0	0	1	**53**	9	17	6	0	0	0	0	**51**	0	5	0	5	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	149
up	28	3	1	1	0	**98**	24	22	**48**	35	3	3	2	26	6	28	0	5	0	0	3	5	2	9	5	0	0	0	0	0	0	0	0	357
Sum	28	3	1	2	1	**157**	35	54	**56**	35	3	3	2	**79**	6	34	0	10	0	0	4	6	3	9	5	1	0	0	0	0	0	0	0	537
kraters	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	18	0	0	0	0	2	0	0	0	0	22	0	1	0	0	0	0	15	0	0	0	0	0	3	1	6	4	0	7	0	79
out	0	0	0	17	0	9	2	1	5	0	0	0	0	17	0	2	0	0	0	0	2	0	8	0	0	1	0	0	0	0	0	0	0	64
up	0	5	5	23	2	1	3	0	2	5	0	0	0	**45**	8	13	4	1	13	5	3	1	9	6	1	0	0	0	0	0	1	0	1	157
Sum	0	5	5	**58**	2	10	5	1	9	5	0	0	0	**84**	8	16	4	1	13	5	20	1	17	6	1	1	3	1	6	4	1	7	1	300
chalices	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
out	0	0	0	0	0	**9**	1	0	0	0	0	0	0	**5**	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
up	0	0	0	0	0	1	3	0	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Sum	0	0	0	0	0	**11**	5	1	3	2	0	1	0	5	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30

Appendix 5O cross table of rim forms and direction of the rim

closed	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	0	0	8	0	1	7	0	0	0	0	6	0	1	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	27
out	0	0	0	10	1	**46**	7	4	2	0	0	0	0	**62**	0	9	0	13	0	0	1	0	12	0	0	0	0	0	0	0	0	0	0	167
up	7	0	9	7	0	**46**	3	0	18	2	0	0	1	**72**	7	8	12	**172**	20	0	1	5	11	13	0	0	0	0	0	0	0	0	0	414
Sum	7	0	9	17	1	**100**	10	5	27	2	0	0	1	**140**	7	18	12	**185**	20	0	3	5	23	14	0	0	0	0	1	0	0	1	0	608
jars	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	0	0	10	0	4	8	0	0	0	0	7	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	31
out	0	0	0	7	1	9	3	7	1	0	0	0	0	21	0	0	0	11	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	64
up	2	1	0	2	0	28	4	7	13	2	0	0	1	33	1	6	1	**155**	3	0	0	0	2	2	0	0	0	0	0	0	0	0	0	263
Sum	2	1	0	9	1	**47**	7	18	22	2	0	0	1	**61**	1	7	1	**166**	3	0	0	1	6	2	0	0	0	0	0	0	0	0	0	358
EB-only	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	0	0	**8**	0	**13**	1	0	0	0	0	3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	26
out	0	0	0	1	0	2	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	8
up	1	1	0	0	0	**8**	4	**12**	0	1	1	0	0	**6**	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37
Sum	1	1	0	1	0	**18**	4	**29**	1	1	1	0	0	**9**	0	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	71
jars noEB	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	0	0	3	0	0	7	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
out	0	0	0	6	1	7	2	1	1	0	0	0	0	16	0	0	0	11	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	47
up	1	0	0	2	0	**21**	1	0	13	2	0	0	1	**27**	1	4	0	**154**	3	0	0	0	2	2	0	0	0	0	0	0	0	0	0	234
Sum	1	0	0	8	1	**31**	3	1	21	2	0	0	1	**47**	1	5	0	**165**	3	0	0	0	4	2	0	0	0	0	0	0	0	0	0	296
jugs	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	0	0	4	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	1	0	10
out	0	0	0	4	0	**39**	5	3	1	0	0	0	0	**45**	0	8	0	1	0	0	1	0	10	0	0	0	0	0	0	0	0	0	0	117
up	6	0	9	5	0	22	2	0	5	0	0	0	0	36	5	4	0	14	4	0	1	5	8	11	0	0	0	0	0	0	0	0	0	137
Sum	6	0	9	9	0	**65**	7	4	6	0	0	0	0	**82**	5	12	0	15	4	0	3	5	18	12	0	0	0	0	1	0	0	1	0	264
small c.	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
out	0	0	0	0	0	**16**	4	1	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26
up	0	0	0	0	0	4	0	0	2	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Sum	0	0	0	0	0	**20**	4	2	2	1	0	0	0	5	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
pithoi	0	10	11	11D	11E	1A	1B	1C	2A	2B	2C	2F	2I	3A	3B	3C	3D	3E	3F	3G	3H	3I	3J	4	4C	5G	6B2	6B3	6B5	6F	7	8	9	Sum
in	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
out	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
up	0	0	0	0	0	3	0	0	0	0	0	0	0	**9**	1	0	**12**	4	**13**	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**43**
Sum	0	0	0	0	0	4	0	0	0	0	0	0	0	**11**	1	1	**12**	5	**13**	0	0	0	1	0	0	0	0	0	0	0	0	0	0	48